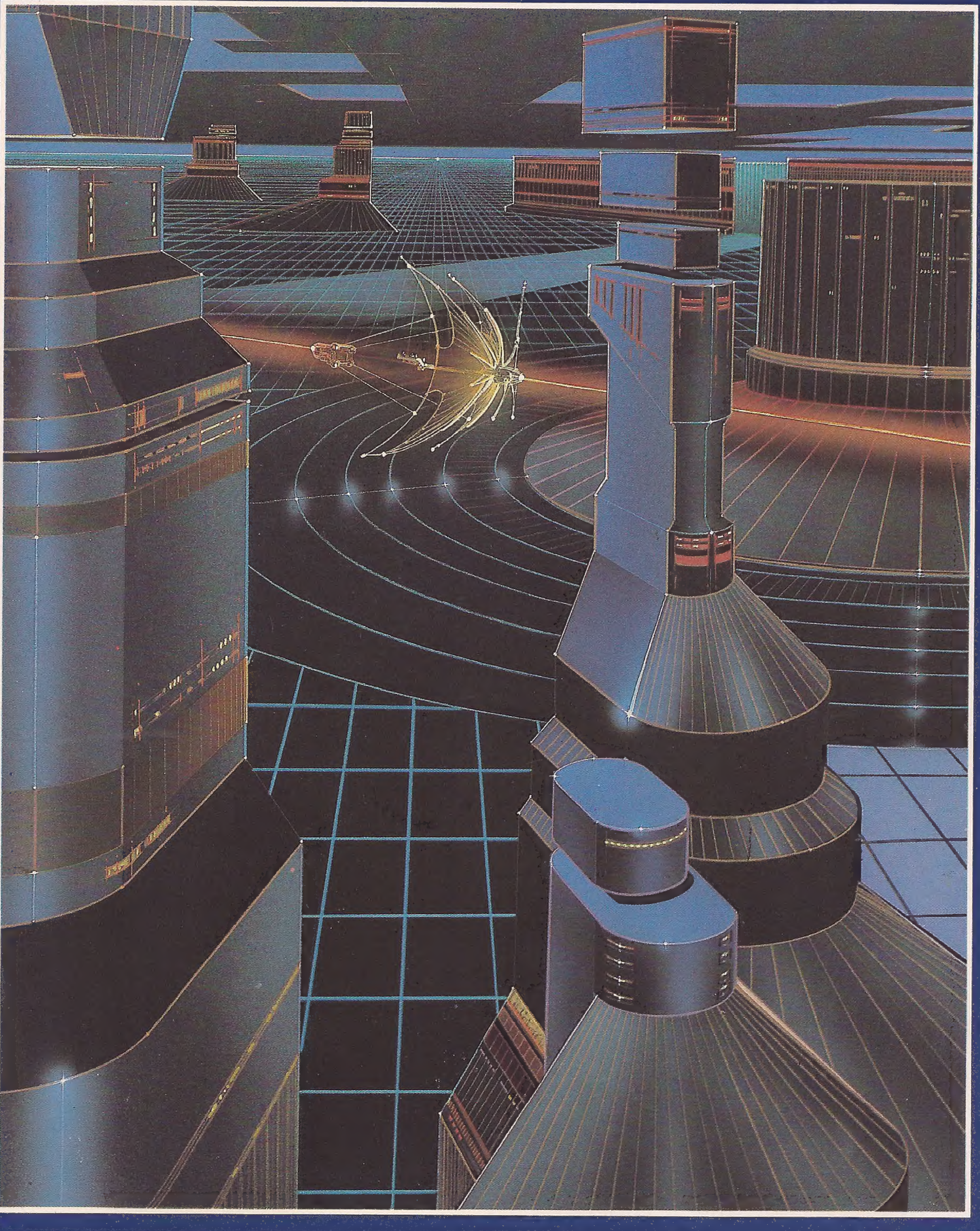
THE ART OF
TRON

BY MICHAEL BONIFER



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PICTURE EDITOR
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The solar sailer traveling through a domain in the Sea of Simulation.
Back cover illustration: Sark's map of domains, carrier bridge,
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1. INTRODUCTION

In the autumn of 1975, Dr. Phillip Mittelman, president and founder of the Mathematical Applications Group Inc. (MAGI) of Elmsford, NY, displayed a series of surrealistic images created on his company's computers to a gathering of Boston-area filmmakers. He proposed that such computer-generated imagery would open new vistas to filmmakers, freeing them of the many constraints of special effects photography. If Mittelman's mission in Boston was to generate business for MAGI, his presentation had little immediate effect. Computer simulation—the creation of three-dimensional objects using the calculations and memories of computers—was expensive, unwieldy, and too abstract for artists accustomed to working with more tangible tools.

One member of that Boston audience was a twenty-four-year-old filmmaker named Steven Lisberger. From a converted downtown loft dubbed Lisberger Studios, he and several associates produced animated and live-action short subjects for local television stations. As an artist trained in animation, Lisberger was impressed with the way MAGI's computer imagery conquered perspective—a classic bugaboo for animators. He recognized the possibilities described in Mittelman's speech and, though he was not immediately in the market for MAGI's product, he mentally catalogued the idea of someday using simulation in a film. Seven years later, that idea, paired with an equally unique optical technique called "backlight compositing," became a reality in the making of "TRON."

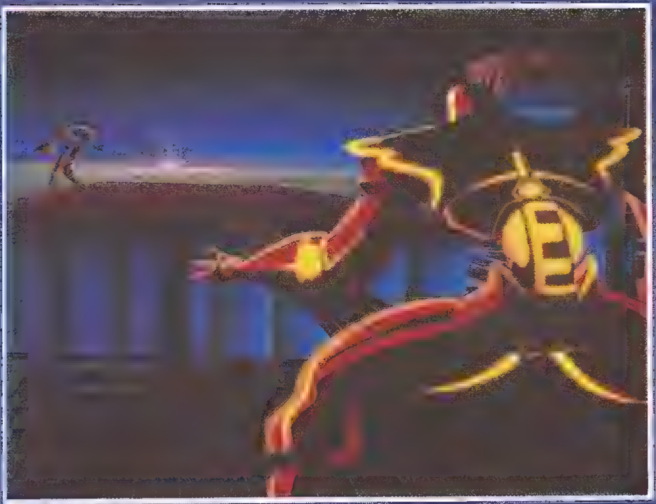
In 1978, Lisberger and producer Donald Kushner relocated Lisberger Studios in Venice, California, to complete work on an animated film entitled "Animalympics." While work proceeded in that project, Lisberger began formulating another story called "TRON." Initially, the story was based on a character named Tron who was a player in an electronic football game. However, that notion was soon abandoned as story meetings in the Venice studio enlivened the fantasy. Fueled by a curiosity about computers and video games, Lisberger and his team sketched out a full mythology set within the memory of a computer system. The character of Tron became one of the many populating the story.

"TRON" was the story in which Lisberger envisioned using computer-generated imagery (CGI) to create fantasy elements. His idea was to set animated characters in a world generated by computer. Further experimentation with the idea suggested that it might be possible to blend live-action characters with the computer images. Lisberger and Kushner spent nearly two years piecing the various parts of the project together.

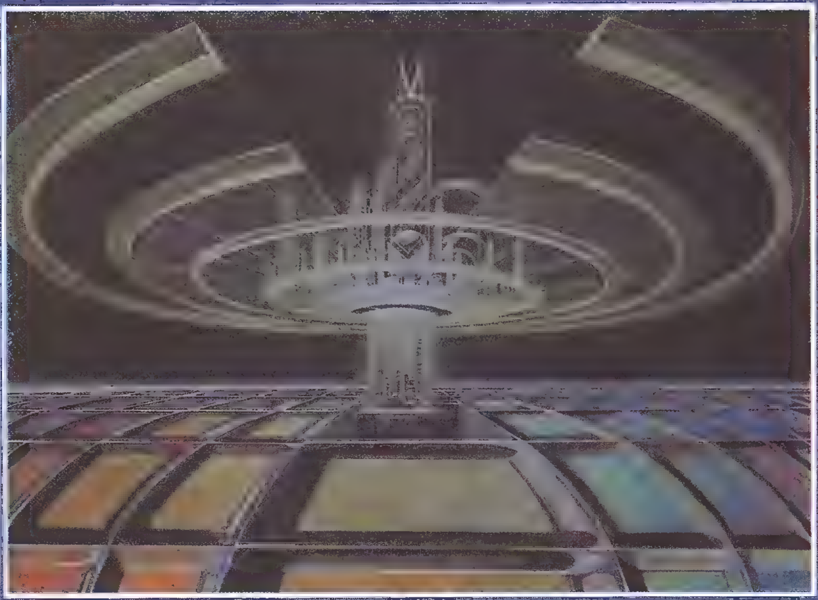
In June 1980, armed with a 300-page binder containing script, design renderings, and technical data, Lisberger and Kushner presented "TRON" to Walt Disney Productions. After several months of negotiation and experimentation, the studio agreed to finance the production.

Preproduction work on "TRON" lasted until April 1981. Live-action photography with the actors took place from mid-April to early July. The postproduction process of combining the many special effects took ten months to complete. The final product was a revolutionary mixture of optical techniques and live-action filmmaking. "TRON" introduced computer-generated imagery (CGI) on a large scale to motion pictures.

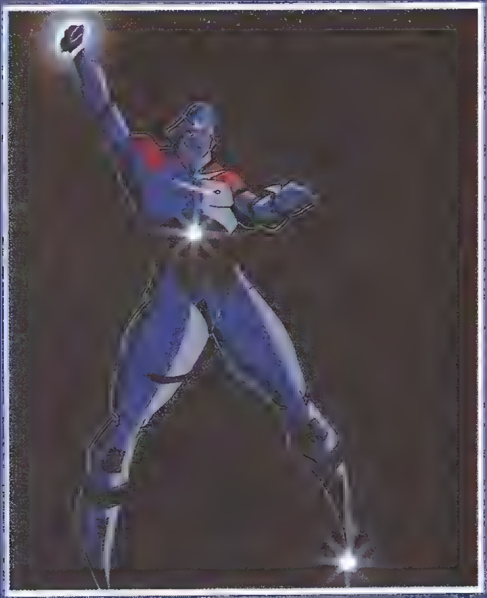
MAGI, along with Information International Inc. (Triple-1) of Culver City, California, Digital Effects Inc. of New York City, and Robert Abel & Associates of Los Angeles, provided the CGI for the fantasy world of "TRON." It may have been seven years in the making, but for Phil Mittelman and his peers in the simulation business, "TRON" was the confirmation of a belief. For Steven Lisberger, it was the realization of a dream.



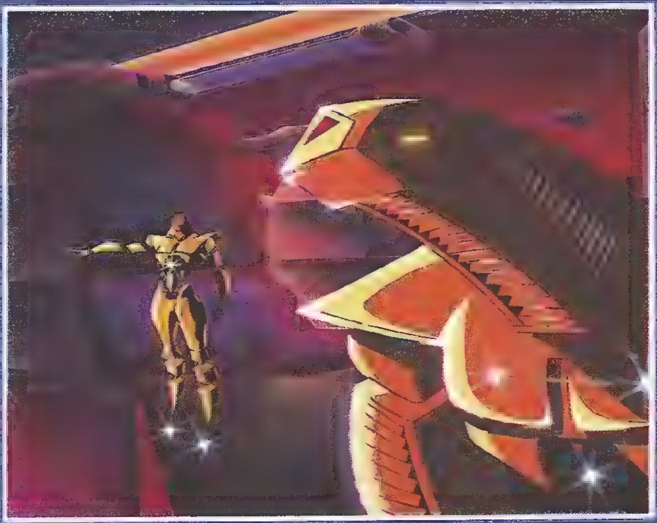
Early Tron, John Norton drawing, Peter Mueller background



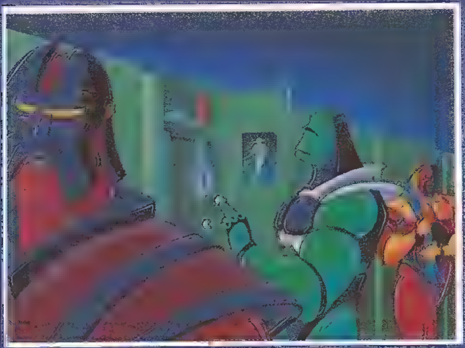
Early color concept, Chris Lane



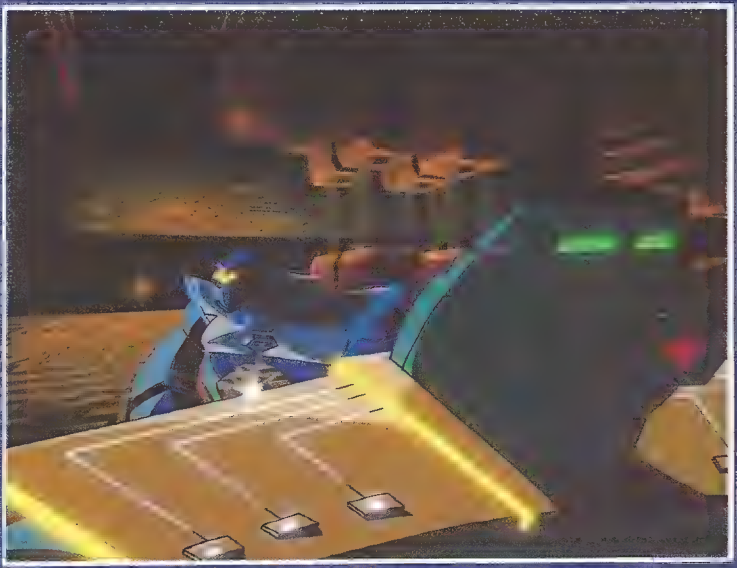
Early Tron, John Norton



Early Tron, John Norton drawing, Peter Mueller background



Early animated concept
Warriors in a locker room, John Norton



A John Norton drawing over a Peter Mueller background. The warriors are painted; however, some backlight is used (e.g., eyes)

2. EVOLUTION

An American Film Institute grant of $10,000 permitted Lisberger Studios to begin creation of an animalized parody of the Olympic games entitled "Animalympics." Work on the film—which was to have been a six-minute short—began in 1976. Spurred by Steven Lisberger's creative drive and later by Donald Kushner's financial insight, the film expanded into a ninety-minute feature with a multimillion-dollar budget. Lisberger's and Kushner's plan was to use the income from "Animalympics" to finance their next project, which writer-director Lisberger wanted to do with backlit characters and computer-generated imagery.

While Kushner hunted down the financing for the feature-length version of "Animalympics," Lisberger expanded the staff of his studio, a converted loft near the Boston waterfront, which for four years had supplied animation for such programs as public television's *Rebop* and *Nova* and nationally broadcast commercials. Lisberger had formed his company with a few associates (including his future wife, Margaret Flook, who became vice-president of Lisberger Studios and associate producer of "Animalympics"), while studying for his master's degree at the School of the Boston Museum of Fine Arts. A flimmaker with enormous energy and a curiosity to match, Lisberger graduated from the Museum School in 1974. While there, he had produced a film, "Cosmic Cartoon", which was nominated for a student academy award. He is descended from three generations of artists, including a grandmother who was a silent film actress in Germany.

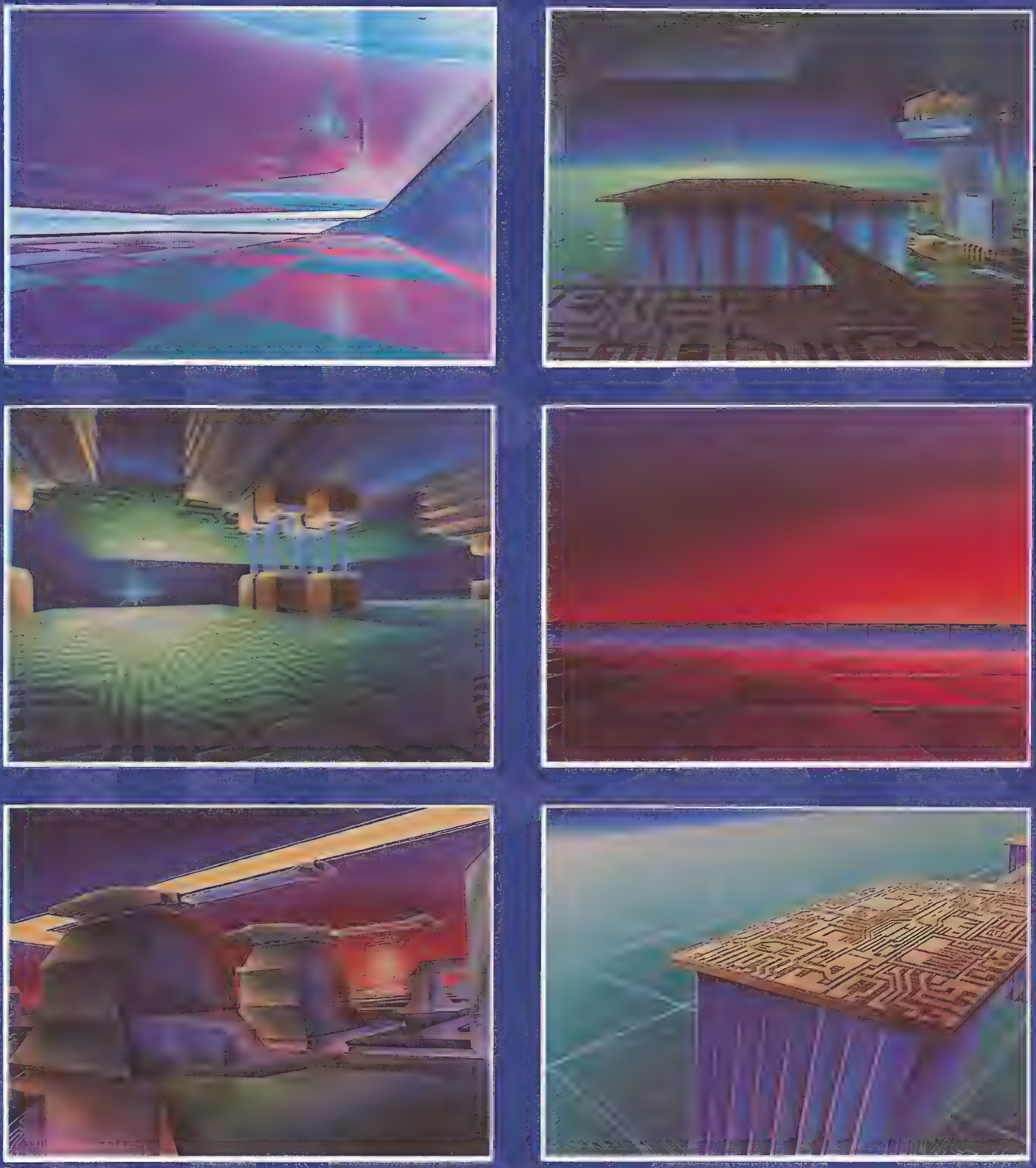
Lisberger's association with producer Donald Kushner began in 1977. Kushner, a lawyer who had spent a year in Florence, Italy, studying fine arts, began producing stage plays in 1975. In the following two years, he not only produced such plays as *P.S. Your Cat is Dead* and *I Am Woman* for the Boston stage, but also formed his own film distribution company and spearheaded a drive to establish the Boston Repertory Theater.

Early in 1978, it was apparent to Lisberger that the Boston area could not provide enough qualified artists and animators to complete "Animalympics" in two years in time for the 1980 Olympics. After much transcontinental scouting, the decision was made to move the production to the West Coast. Along with eighteen artists who were part of the Boston production team, Lisberger and Kushner set up shop in a studio in the beach city of Venice, California. NBC-TV agreed to air "Animalympics" in prime time as part of their 1980 Olympics television package, and it looked as if the idea of financing "TRON" with the funds from the animated film was a possibility.

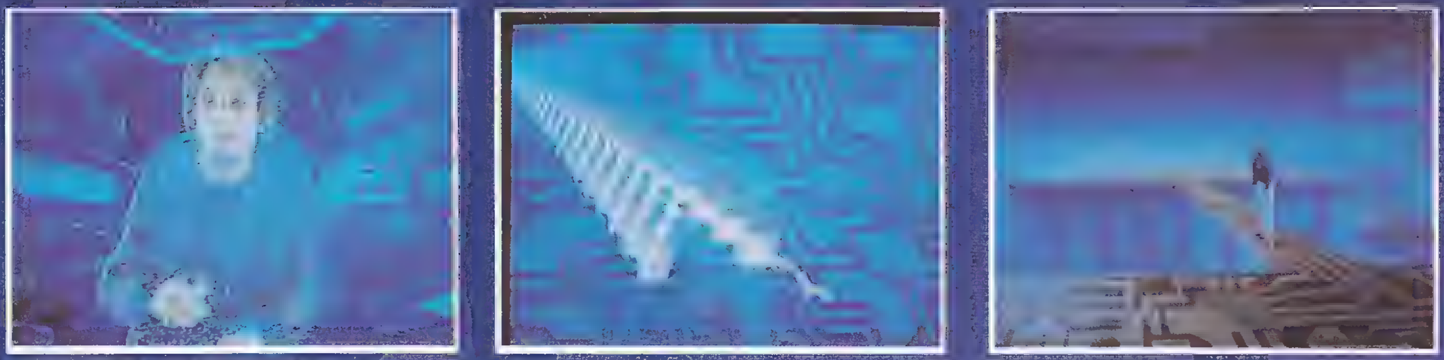
Jimmy Carter, of course, decreed that the United States would bypass the Moscow Olympics, leaving NBC with a $20 million television bag to hold. "Animalympics" was suddenly without an outlet. It was an important event in the life of "TRON," because it meant that the movie had to be financed at an existing studio. It meant that "TRON," upon its arrival at Disney, would be subjected to a range of ideas unprecedented in a motion picture. Not since the studio's own "Snow White" in 1935 had such a wholly unique movie been visited on Hollywood.

The genesis of "TRON" was in large story conferences held in late 1978 at the Venice studio. Artists working on "Animalympics" gathered in their spare time to play the studio's video game in the conference room and exchange ideas about Lisberger's conception of an electronic character named Tron, the mightiest warrior in a world made of electronic games.

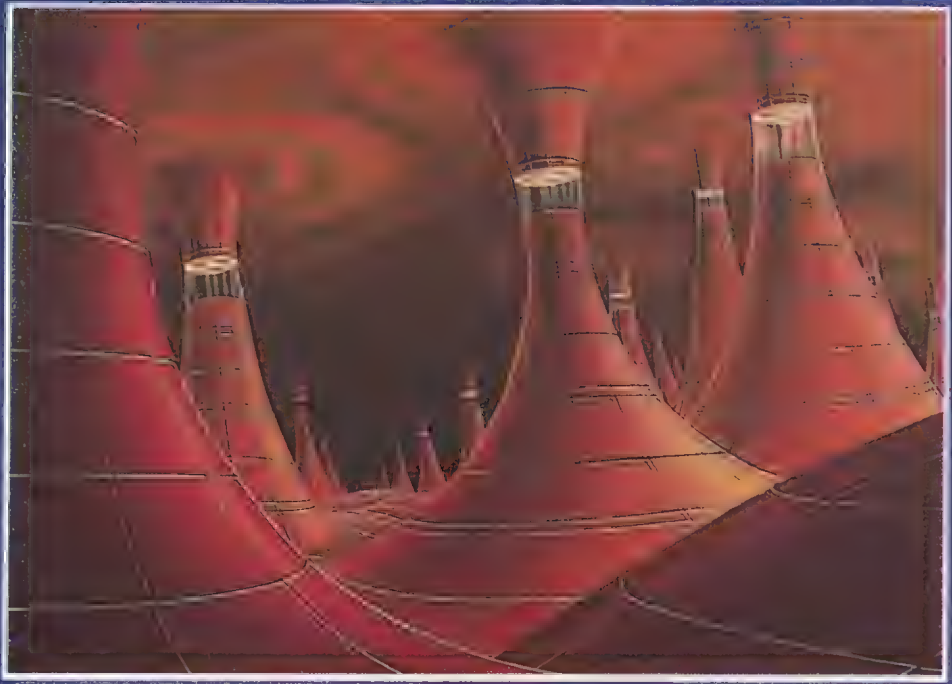
"The story and art for 'TRON' developed together," said Lisberger. "In my mind that was always a crucial thing about the movie. Since we were cooking up this fantasy world from scratch, we relied on the visuals to tell us the story. If somebody did some sketches for a character or an environment that worked from a design standpoint, they went into the script."



Peter Mueller backgrounds

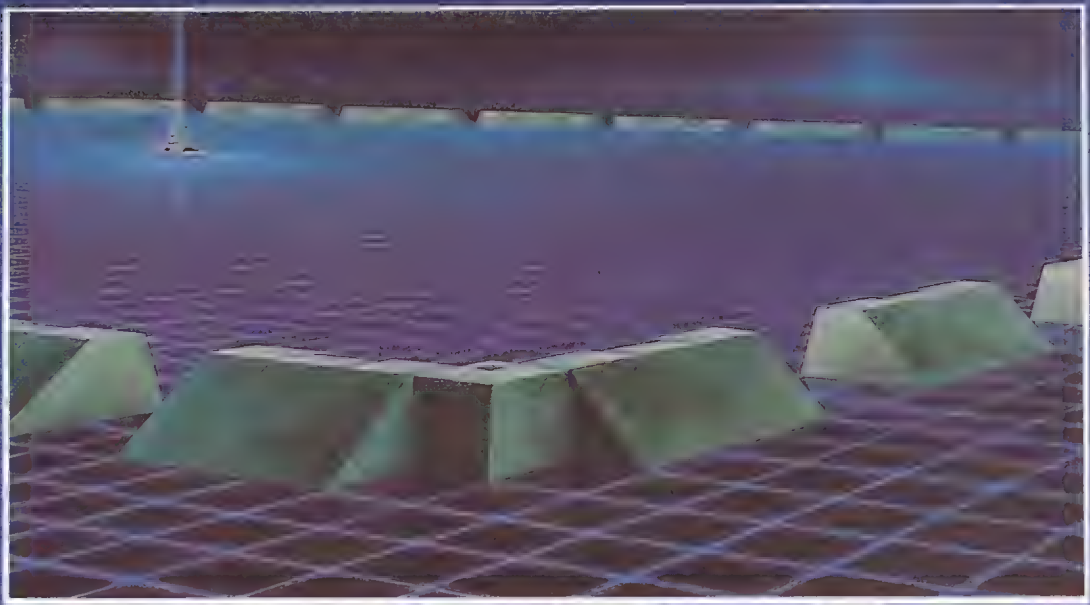


An early "TRON" test utilizing video



Tron character concept, John Norton

Chris Lane drawings, Peter Mueller paintings



John Norton drawing, Peter Mueller painting

The initial concept was to make the electronic world sequences of "TRON" totally animated. But very early in the development of the story, Lisberger and his team began thinking of making it with real actors. It was suggested that perhaps a technique of video compositing would permit actors to perform in a fantasy world built of CGI.

"It may work on TV, but it doesn't on the big screen," commented Kushner. "There wasn't enough resolution in the image, and it was easy to see that the characters and the backgrounds were different elements." To achieve the desired backlit effect, Lisberger even tried a special pen which was supposed to print "glows" directly onto film negatives, but this, too, was ineffective.

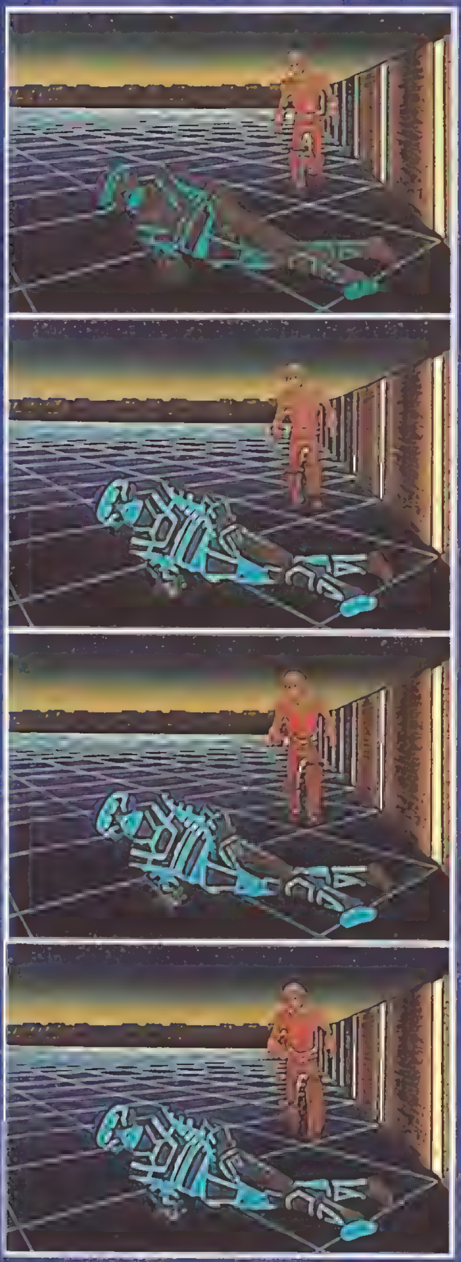
Experimentation by Lisberger and his staff eventually led to the method used to make "TRON"'s characters electric. By photographing an actor in black and white, then reprocessing the film using colored filters and backlight, live characters took on a design which effectively linked them with their surroundings in the electronic world. Notes Lisberger, "Just as the computer-generated imagery is made up of light and energy, the challenge was to create characters that would evolve beyond flesh and blood and visually marry with the electronic world."

A second significant development during the Venice days was the widening of the scope of the story. Originally, Tron was the superbeing in a world of electronic amusements. Later, Tron was surrounded with a chorus of characters populating a landscape representing the information within a computer system. Story sessions at the Venice studio were punctuated with the sounds of turning pages of computer dictionaries, as the artists hunted for the metaphors upon which to peg the "TRON" adventure. In the refined version of the story, video games became the passageway into an electronic universe. Information entered into a computer was sketched to life in the form of programs, recognizers, simulations, bits, and the Master Control Program.

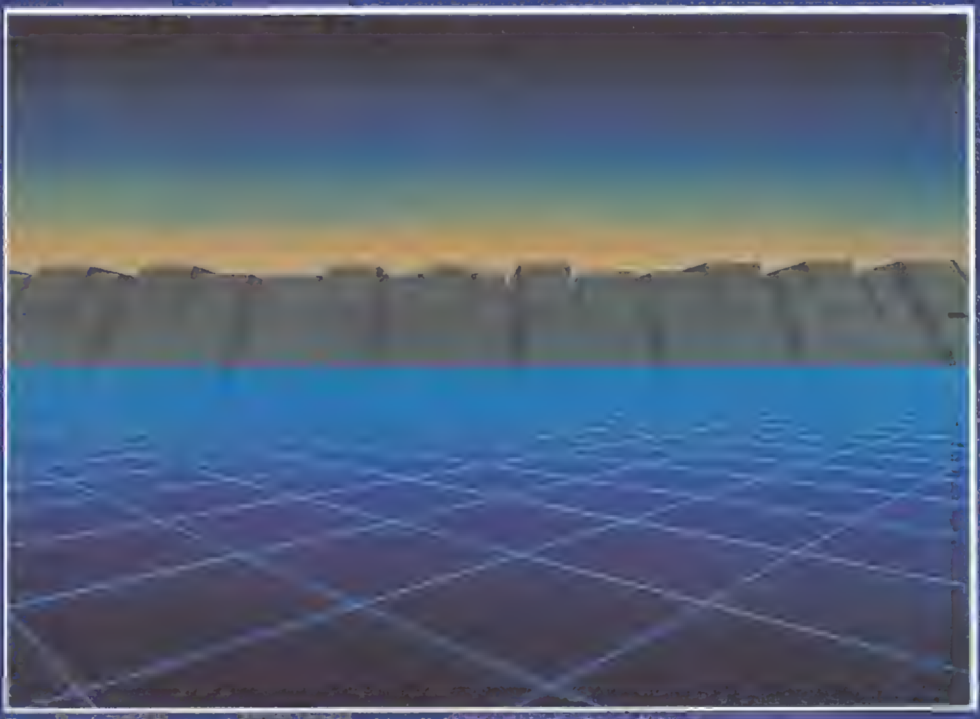
Artists John Norton, Roger Allers and Chris Lane were instrumental in creating early versions of the characters and environments. Norton and Allers were part of the "Boston 18," Lane a California artist who worked in pencils and pastels to suggest designs. They worked with animator Bill Kroyer, who concentrated on laying out the film's action, background artists Peter Mueller (also brought from Boston with the original group), Bonnie MacBird (a story editor with experience at Universal Studios), and Alan Kay, a computer specialist moonlighting from his job with Xerox (he later joined Atari's game division). As the project developed through 1979, it was metamorphosing into the "gonzo movie that would melt the Naugahyde off the Lazy-Boys of Middle America" (one contributor's description of "TRON").

One of the most important aspects of the movie was the CGI—the computer-generated imagery. From the outset, this untested (in motion pictures) technique had been a "TRON" ingredient. CGI was originally developed in the '50s by scientists and engineers for use as a tool in product design, medical research, and flight simulation for pilot training. Gradually, professions such as architecture gave the process applications that were part engineering and part art. The first use of computers for purely visual art occurred in the late '50s and early '60s, when artists such as John Whitney Sr. and Lee Harrison experimented with the machines as creative tools.

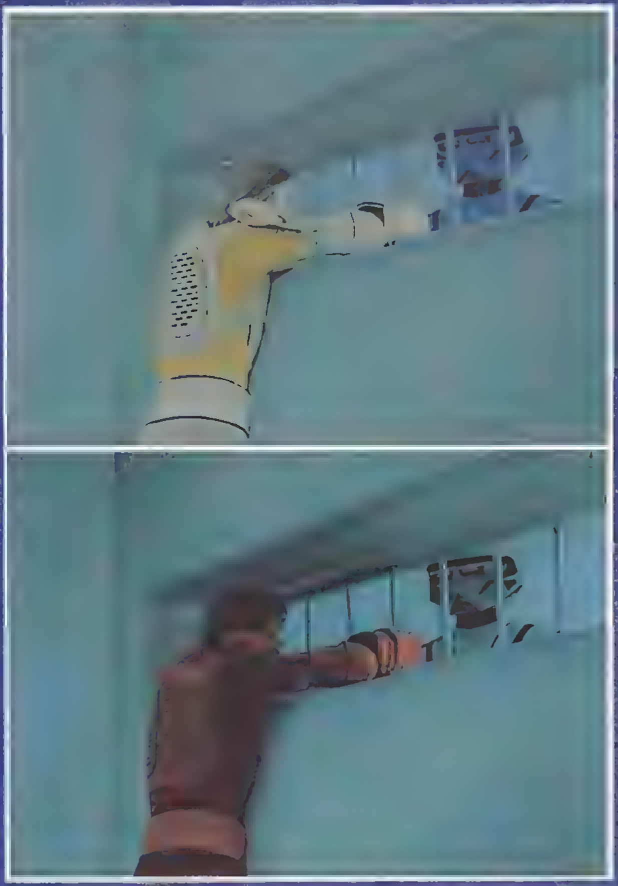
CGI had been used briefly in other movies—"2001, A Space Odyssey," "Star Wars," "Futureworld," and "Looker"—but it was too cumbersome for creating sustained scenes. In the late '70s, however, computer power increased at a supercharged rate. Lisberger and Kushner kept abreast of the improving efficiency of CGI and the astounding images being generated by groups such as MAGI, Information International, the New York Institute of Technology, and Digital Effects Inc. They



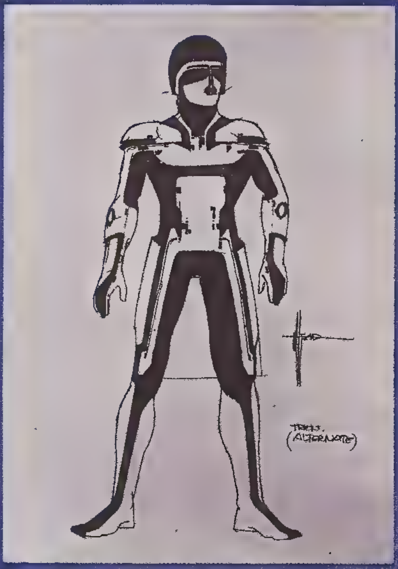
Frame clips from Steven Lisberger's preproduction test



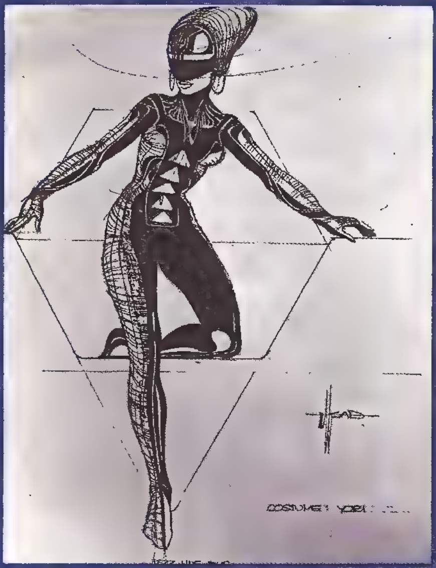
Test background designed for conventional top-light photography. Brian Sebern



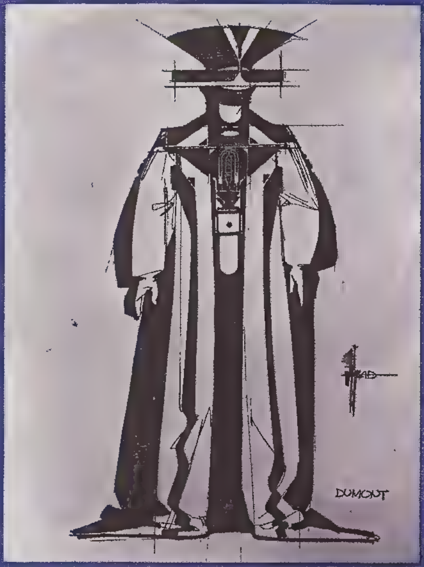
Color models used for preproduction test footage assembled by Steven Lisberger. Here the character is painted with conventional cel paint. Only the costume circuitry was to be added with backlight.



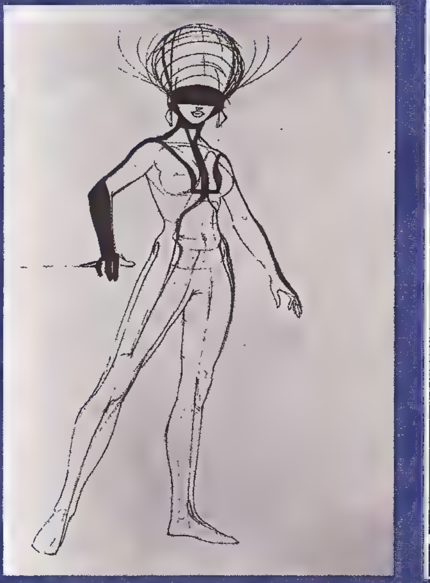
Early Tron costume concept. Syd Mead

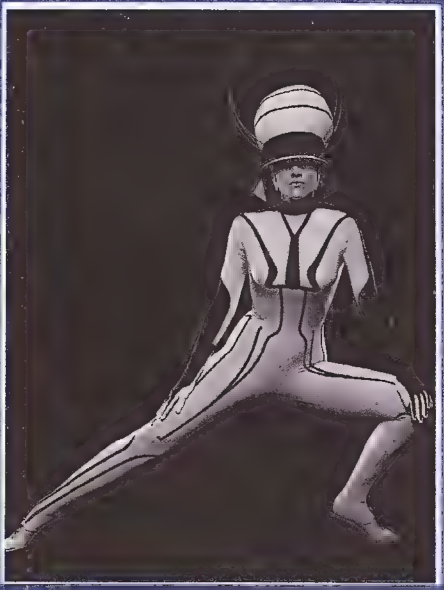


Early Yori costume concept. Syd Mead

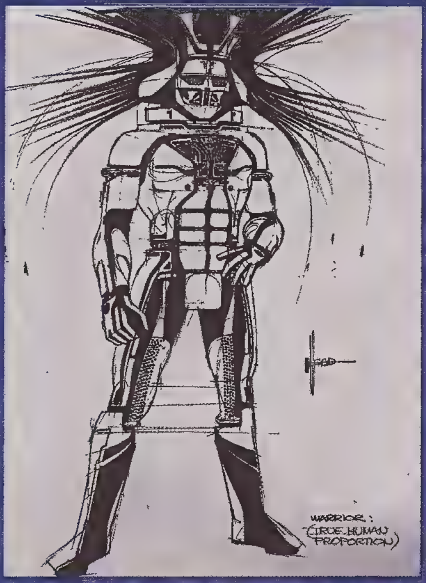


Early Dumont concept. Syd Mead

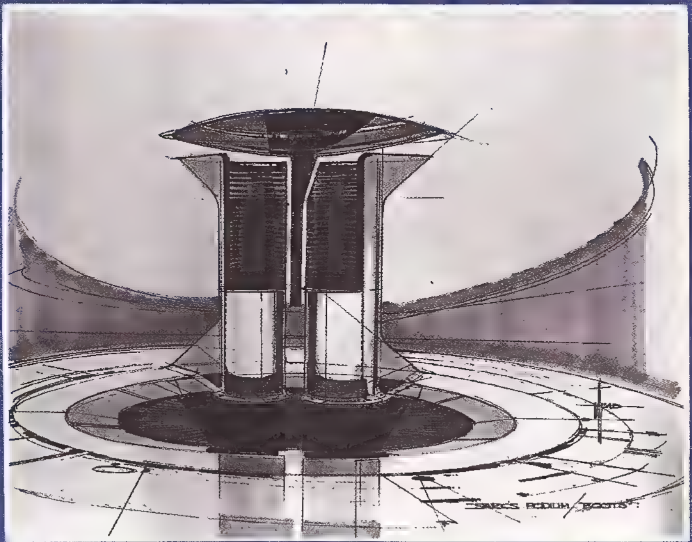




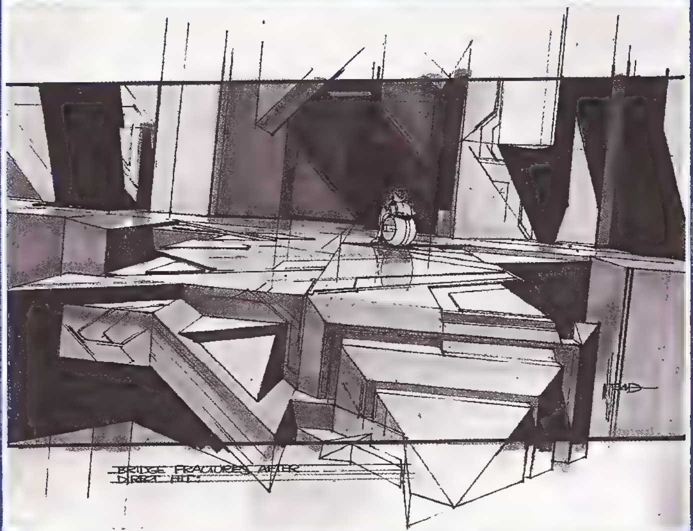
Character design for the electronic cityscape. Syd Mead



Concept for a character in the electronic world. Syd Mead



Sark's control podium on the carrier. This early Syd Mead design was later changed by deleting the middle section. Here Sark received commands from the MCP.


BRIDGE FRACTURES AFTER DIRECT HIT

Tron views a bridge destroyed by one of Sark's tanks. Syd Mead were convinced that the technology to create a three-dimensional computer world for "TRON" would soon be available.

To properly work the computer imagery into the story, Lisberger spent a lot of time at Information International Inc. in Culver City, California, where artists John Whitney Jr. (son of the pioneer computer artist mentioned earlier), Gary Demos, and Richard Taylor were teaming up to design computer art that was among the most sophisticated in the world.

"Steven was always around, checking out how things worked," remembered Taylor. "He told us about a film he was planning, and one day we went to Venice to look at the storyboards. It looked really far-out, but it was in such an early stage of development that none of us knew if anything would come of it."

For his part, Lisberger gained a fuller understanding of CGI through his visits to Triple-I. "Coming from a background of conventional animation, it's easier to grasp the fragmented mechanicals of computer-generated work than it would be if your background were strictly live-action film," he said. "I also learned to appreciate how the computer hacks—the people who live at the terminals—think and act, and this helped with the characters in the story. When we were casting, I consciously tried to match up actors with some of the people I'd met at Triple-I."

At Triple-I, however, the filmmakers did not have an easy time computerizing the complex parts of the movie. "When we were putting the project together," noted Kushner, "the technology to do the computer art we needed didn't actually exist yet. But we were counting on the fact that computer technology was improving so quickly that by the time we were ready to make the movie, it *would* exist."

No single company could supply all the imagery for the electronic world. Because each company tended to have singular software for generating its imagery, there was the problem of delegating work to several different firms. There was also the problem of integrating the backlit live-action footage with the CGI. Could it be done on the scale necessary for a feature film? Would all the different production "modules"—the CGI, the live action, the photo effects—combine into a believable movie world? These were the most challenging problems that Lisberger and Kushner would face as they began peddling their fantasy to the major movie studios early in 1980.

Disney was not the first studio that Lisberger and Kushner approached with the "TRON" project. It was, they figured, one of the least likely homes for the movie. They had no acquaintances there. And it was their perception that the studio whose main body of work is hand-drawn cel animation would be unreceptive to the notion of computer-drawn art. But Disney had recently hired a young production chief, Tom Wilhite, whose policy was to give an unprejudiced ear to any filmmaker with a story to tell.

Wilhite's first contact with "TRON" was in a phone conversation with Kushner in June 1981. "To tell the truth," the Disney executive admitted, "I didn't hold out much hope to them. It sounded like an idea for a traditional animated film, and we develop those from within the studio. But when I saw their presentation, I was immediately interested. It was the most interesting idea I'd seen, an entirely new mythology of characters. We wanted to get back into the risk-taking business at Disney, and 'TRON' looked like the perfect project to do it with."

Lisberger commented, "I think what impressed them about the project was that we didn't leave any stones unturned in our presentation. We didn't just have a story. We had the technical information to back it up."

Older hands at Disney were not so immediately swayed. Lisberger, after all, had never directed a live-action feature film. There were doubts that methods proposed in the ponderous "TRON" notebook would work in reality. With management opinion divided over whether to finance the movie, Lisberger and Kushner were asked to assemble a two-minute sample of "TRON" in the way it would look in its finished format.

Because only a skeleton crew of production personnel was available to concoct the test footage, Lisberger had to improvise. In the money allotted by Disney, there was no costuming budget, so outfits worn by actors in the test were an assortment of hockey gear, dance leotards, and leftover robot costumes from "The Black Hole." Lisberger's associates Rich Fernalld and Paul Nevitt had experimented with 35mm black-and-white photography as a basic element for the electronic world, and that technique was used to photograph the test characters. Backgrounds were painted by David Mattingly and Brian Sebern, and computer imagery from Triple-I, MAGI, and The New York Institute of Technology comprised a sampler of the movie's potential for the fantastic. A frisbee specialist, Sam Schatz, was summoned to create a series of on-camera tricks with an "identity disk."

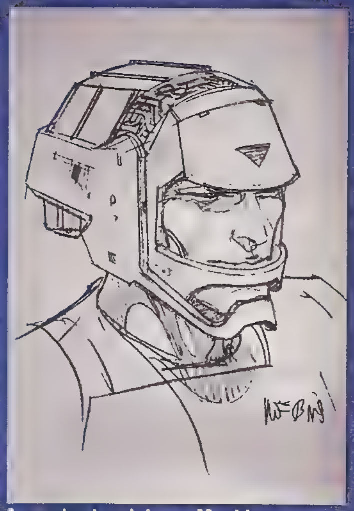
The two-minute test was the clincher. Doubts about Lisberger's ability to direct live actors were dispelled by his smooth and professional handling of the performers. And questions about the feasibility of "TRON" itself were swept aside by the finished sample: a montage of scenes depicting a gold disk warrior in battle, a prisoner in a holding cell, and cuts of computer imagery by NYIT, MAGI, and Triple-I. Shown widely to Disney personnel, the footage solidified sentiment for going ahead with the film.

Nearly everyone who saw the preview footage of the film was awed by its uniqueness. "The people at Disney had their eyes opened by that clip," remarked Kushner.

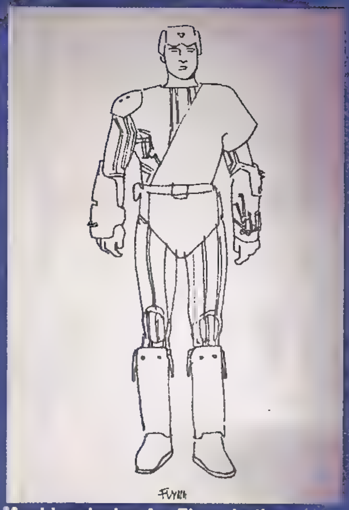
Lisberger observed, "It was to Disney's credit that they didn't ask to see the computers do a puppy. They accepted the fact that there is a use for computer imagery, and that it isn't the same kind of animation the studio has been doing for years."

With the backing of the production executives at Disney, "TRON" was subjected to creative forces that Lisberger had only dreamed about while doing "Animalympics." Futuristic designer Syd Mead, whose art has long been among the most imaginative speculations by companies such as Phillips Electronics, Volvo, and American Motors, was hired to design vehicles and environments. Peter Lloyd, an airbrush virtuoso whose renderings are a staple on record jackets and national magazines, was brought in as a color stylist. Jean "Moebius" Giraud, whose comic-book depictions of Heavy Metal cowboys, outer-space outlaws, and stone-age fantasies are classics among collectors, flew over from France for two intensive preproduction sessions of character design and storyboarding.

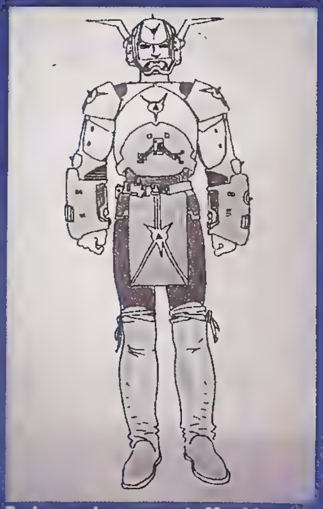
As Mead, Moebius, and Lloyd cranked out their visions for "TRON" in late 1980, other key members of the creative team were hired to turn the abstractions of the story into a movie. Harrison Ellenshaw, matte artist for "The Man Who Fell to Earth," "Star Wars," "The Black Hole," and "The Empire Strikes Back," left Lucasfilms Ltd. in northern California to assume the role of associate producer and co-supervisor of special effects. His partner in supervising effects, Richard Taylor, was art director for the movie technology group at Information International. In the early 1970s, Taylor perfected the backlighting process (known as the "candy apple effect"), which would now be used to bring the "TRON" characters to life. Cinematographer Bruce Logan, whose background is in effects photography, joined the team and suggested shooting the picture with 70mm film (most movies are shot with 35mm film) to give the characters greater clarity on the screen. With the creative core of the production in place, filming "TRON" commenced on April 20, 1981.



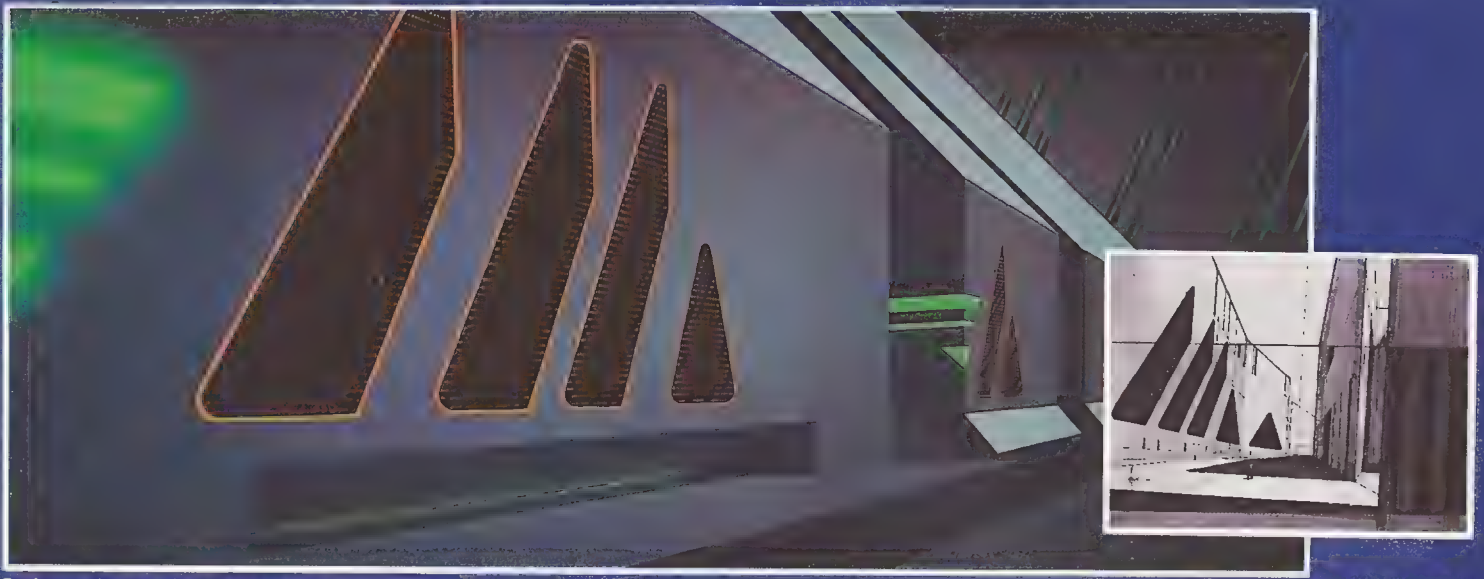
A warrior headpiece. Moebius



Moebius design for Flynn in the electronic world

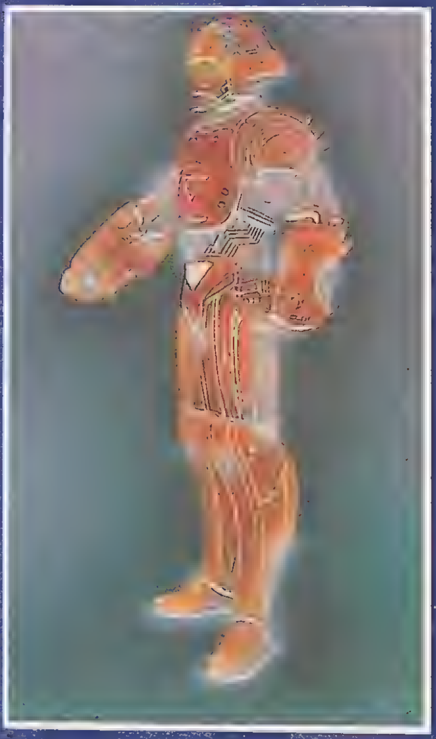


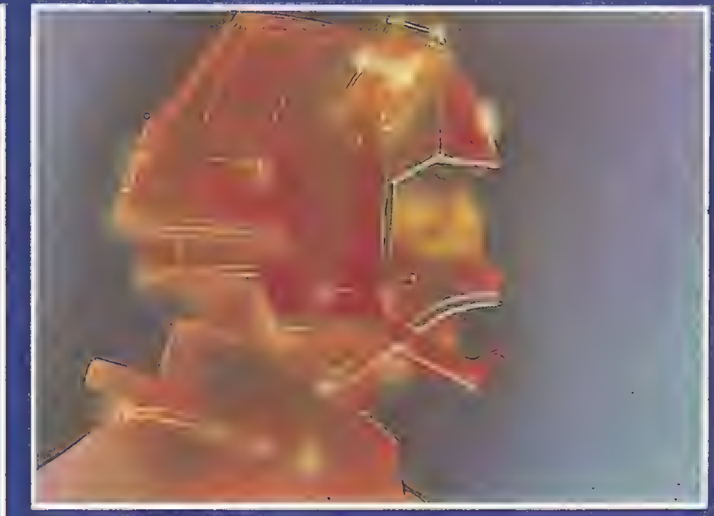
Early warrior concept. Moebius



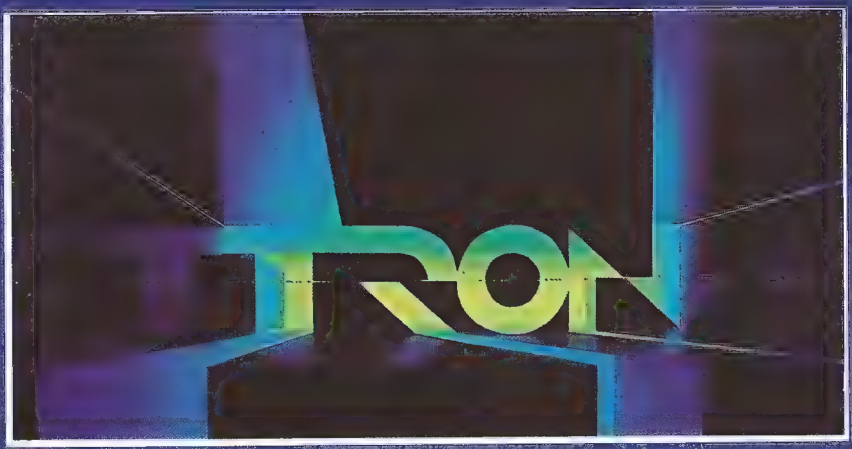
Background with a Syd Mead graphic incorporated. Painting, Donald Towns; composite, Marta Russell

Electronic corridor enchanced with surface graphics. Syd Mead

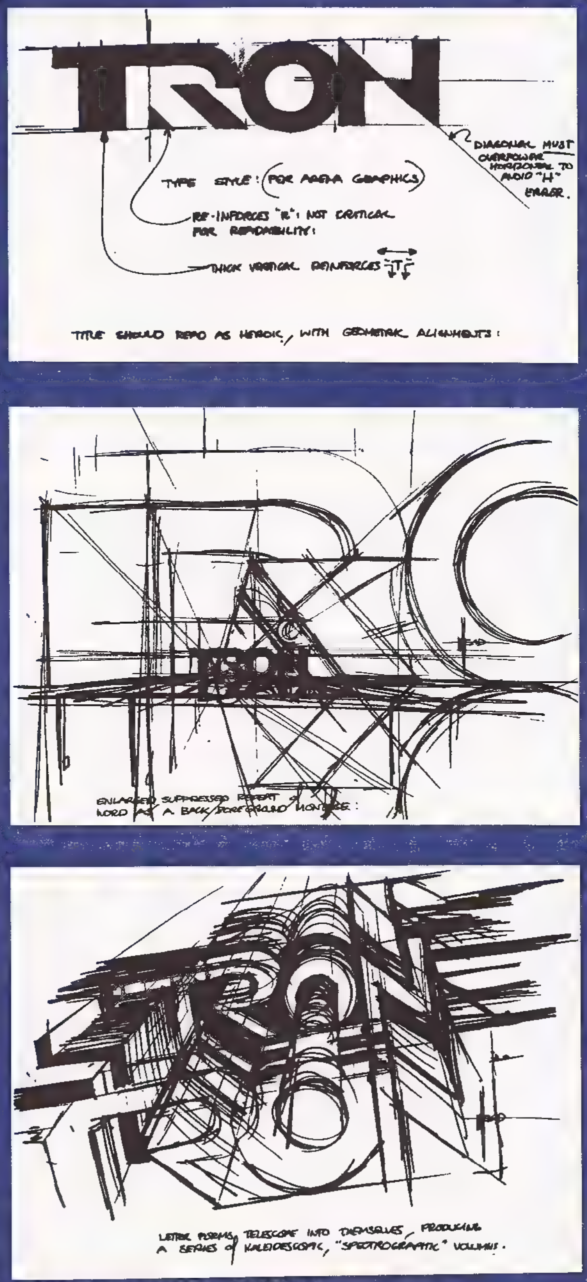




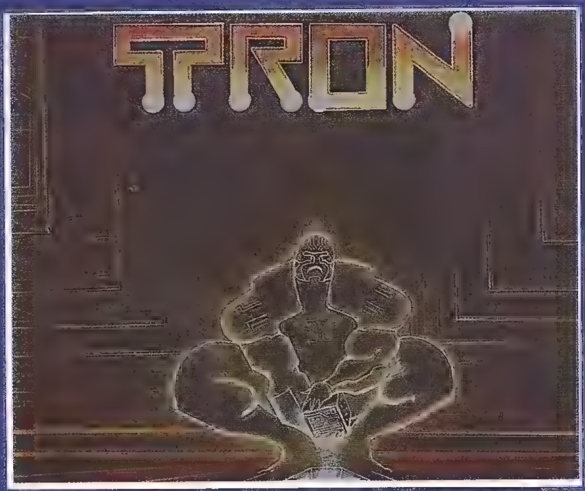
Peter Lloyd "colorizations" of Moebius character concepts



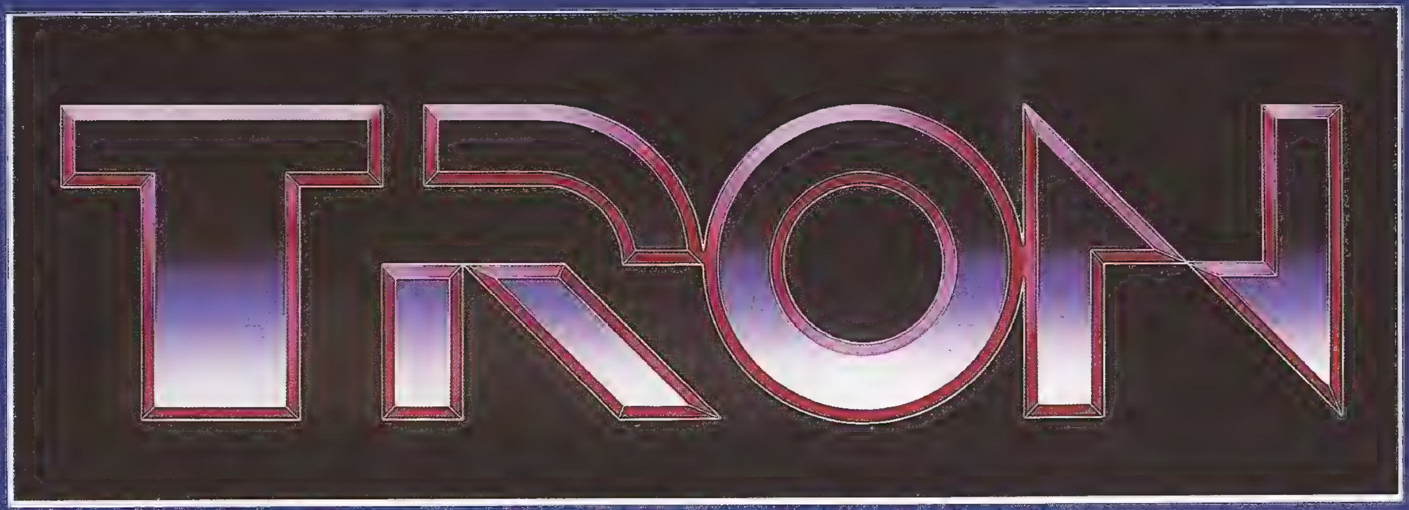
"TRON" logo design, Syd Mead


TRON
DIAGONAL MUST OVERPOWER HORIZONTAL TO AVOID "H" ERROR.
TYPE STYLE: (FOR ARENA GRAPHICS)
RE-INFORCES "R": NOT CRITICAL FOR READABILITY:
THICK VERTICAL REINFORCES "T"
TITLE SHOULD READ AS HEROIC, WITH GEOMETRIC ALIGNMENTS:
ENLARGED SUPPRESSED REPEAT OF WORD AS A BACK/FOREGROUND MONTAGE:
LETTER FORMS TELESCOPE INTO THEMSELVES, PRODUCING A SERIES OF KALEIDESCOPIC, "SPECTROGRAPHIC" VOLUMES.

"TRON" logo concepts, Syd Mead



"TRON" concept including early "TRON" logo, Chris Lane



Final "TRON" logo using backlight composite technique, Richard Taylor, John Scheele, Marta Russell and Douglas Eby

3. TITLE SEQUENCE

The name "TRON" was derived by Lisberger from the simple fact that the word appeared in so much of the terminology relating to science and computers. When Lisberger and Kushner brought the project to Disney, they owned two versions of a logo—one styled in neon light, the other with the letters in the title designed in a circuit pattern.

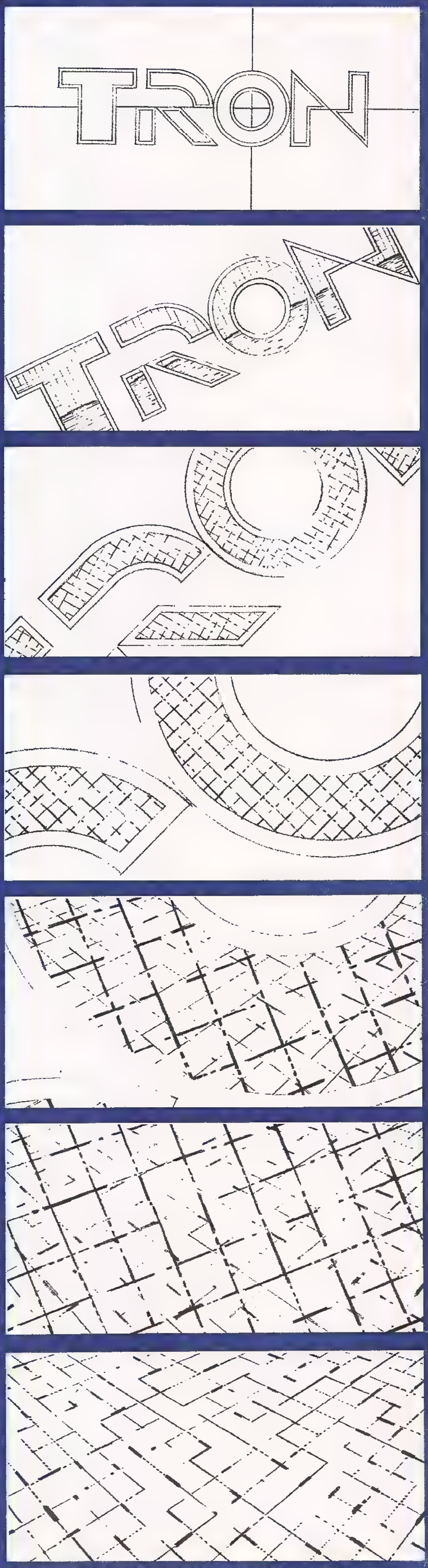
Early in 1981, Syd Mead designed the lettering which became the final "TRON" logo. Richard Taylor added a hard metallic edge and a texture designed to resemble gradations on a video screen. He also moved the "R" slightly away from the "T" to make the title more readable. He based this on a test he performed with his children, who could not read the title with the "R" close to the "T."

Robert Abel & Associates of Los Angeles created the thirty-second title sequence that visually transports the viewer into the world of "TRON." Hand-drawn animation (for the electronic lightning bolt that begins the transition) was combined with computer-generated line art from Abel's Evans & Sutherland Picture II Graphics System to pull the viewer into a computer-simulated cityscape. Abel's system does not create raster graphics, which are three-dimensional images formed by densely packed points of light on a screen, but the other three firms supplying CGI for "TRON" do use raster graphics. With multiple camera exposures and clever employment of line images, Abel & Associates made the final frames of the sequence look like a nighttime view of a metropolis.

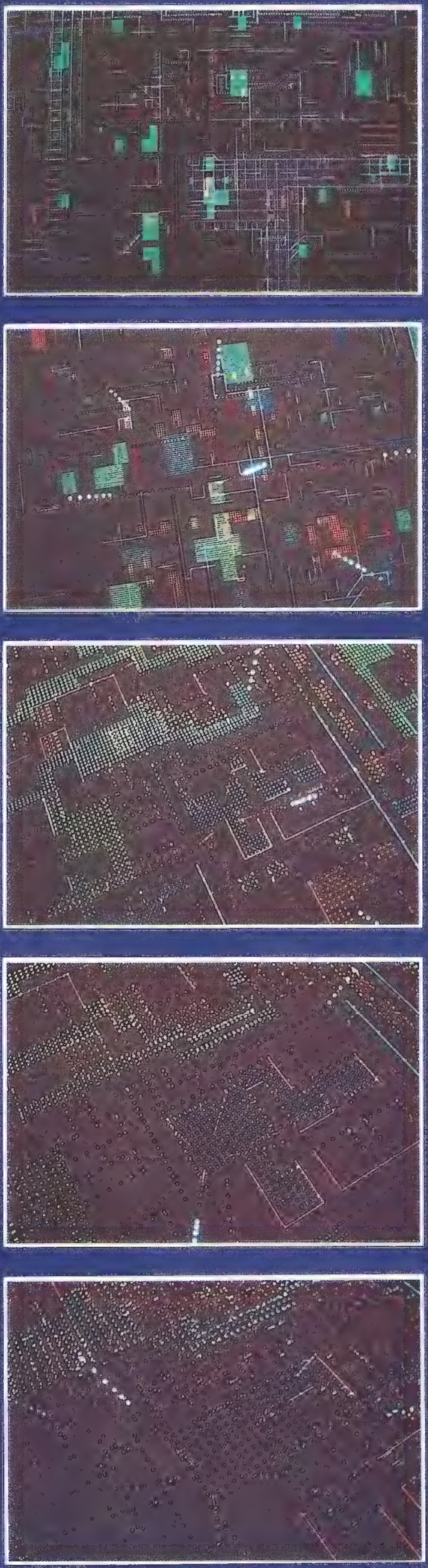
"Our system uses vector graphics, which is a series of points connected by lines," explained Robert Abel. "We can align those vectors so closely together that we can essentially do with our system what other companies do with raster graphics. Even Evans & Sutherland, who manufacturers our equipment, has a hard time believing what we can do with their system." Initial design of the sequence was created by Bill Kroyer and Richard Taylor.

The title sequence is a combination of drawn art (the logo itself), television imagery (the "snow" that fills the lettering in the logo), and CGI (the atmosphere of circuitry and the cityscape). To create the cityscape, Abel's artists mapped out coordinates of buildings in the Hawthorne-Torrance area of Los Angeles and programmed them into the computer system. The various images were combined in the computer memory using a code that allowed the artists to film elements of the sequence simultaneously with different cameras. This use of a single computer code, which can be translated by camera systems is a form of "latent image photography."

Digital Effects Inc. of New York City created the "formation of TRON" sequence for the opening of the film. From a basic design by Richard Taylor, Judson Rosebush of Digital Effects and his team of image-makers calculated the data for the artwork. The twelve-second sequence was divided into three segments that were performed separately and then combined. Rosebush and D.L. Deas were responsible for building the character itself; Don Leich built models for the light rays that poured into the body; and Gene Miller wrote the computer code for the "body panels," which intersected with the light rays, energized, and formed the body. The entire scene was coordinated by Rosebush and was completed in October 1981. It was in time for the first showing of "TRON" footage at the convention of the National Association of Theater Owners in Las Vegas, Nevada.



Storyboards for main title sequence, designed by Richard Taylor and Bill Kroyer



The beginning title sequence as the camera moves through the word "TRON" into an electronic pattern ending within a night cityscape. Created by Robert Abel Associates

4. ENCOM

From the first preproduction meetings at Disney, Lisberger stressed the importance of making the ENCOM (which, incidentally, is not an acronym for a longer name) facilities as futuristic-looking as possible.

The walls of the director's office were at the time papered with photographs of electron microscopes and computer rooms. Lisberger had recently seen a PBS broadcast of a *Nova* show about the Lawrence Livermore Laboratory and government experiments with a huge laser that had a fabulous visual impact. Inquires led producer Kushner to the U.S. government's top-secret facility in northern California, where officials were openly enthused about hosting a Disney motion picture, especially one which painted such a fun-and-fanciful scenario of life inside a computer.

Livermore is the home of the Shiva (named for the Hindu goddess of destruction and creation), the world's largest laser. Kushner arranged with the Livermore Lab for a three-day shooting period during which the laser would be shut down, and received permission for "TRON" to be the first motion picture to use the facility as a setting.

With the cast and crew photographed and fingerprinted for security and feet squeezed into plastic booties to prevent contamination within the laser lab, the Shiva laser was filmed as the setting for Gibbs's and Lora's experiments in "digitizing" oranges. The maze of girders housing the laser's fifty-yard-long accelerator tubes also provided an interesting photographic backdrop for Flynn's and Lora's break-in at ENCOM.

"The thing that was great about Livermore," said Lisberger, "was that you could not possibly build that kind of set. And even if you did try to build on that scale, you could never predict the look you find in the real thing."

The computer lab through which Flynn and Lora sneaked on their way to the terminal in the laser lab was the Lawrence Livermore home of a Cray-1, the world's most powerful computer, capable of processing ten billion bits of information per second. While the memory storage terminals and air conditioning unit for the computer implied its power, the Cray-1's physical appearance was less than awesome.

"This is it?" asked one disbelieving Disney technician at the time. "It looks like a big stereo speaker."

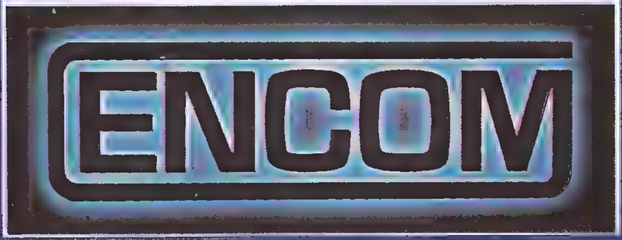
Ed Dillinger's office in the executive suite at ENCOM was the creation of production designer Dean Mitzner and set decorator Roger Shook. Mitzner, whose credits include "1941," "9 to 5," and "The Animal House Class Reunion," gave the office a clean, indirectly lit look and suggested the skyscraping height by building a miniature network of city streets outside Dillinger's window.

"We were conscious that everything in the electronic world would be quite colorful and glowing, so we tried to contrast that by making ENCOM's colors very cool," said Mitzner. "Dillinger's office was particularly low-key with all the gray tones. We wanted it to look something like a museum setting, without personality, to suggest what a cold character he was."

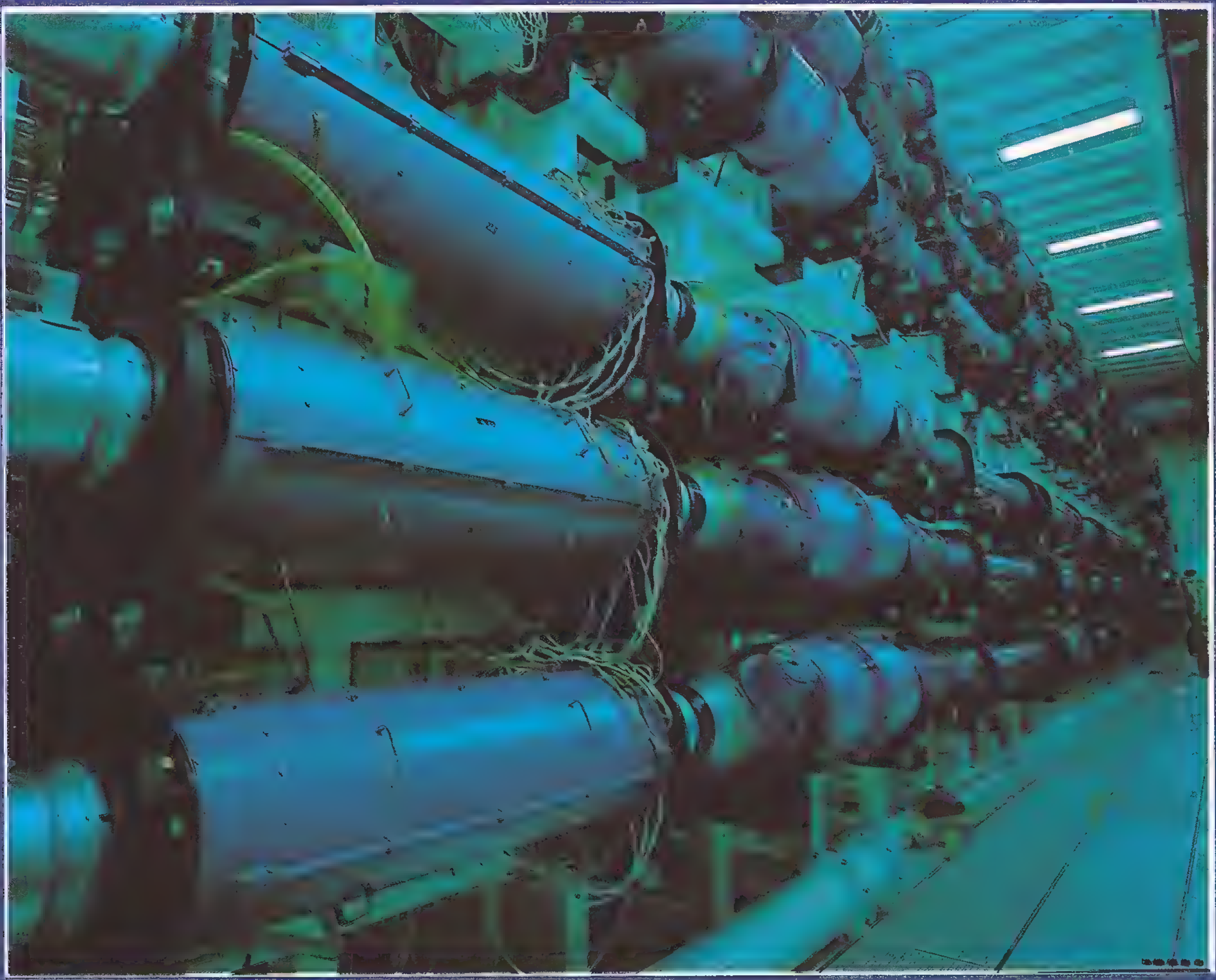
Dillinger's power and the power of the most imposing entity in the film, the Master Control Program, was embodied in his large desk. Suggesting the "paperless office" of the future, Dillinger's desktop was touch-sensitive, permitting him to request either computer output or a means of input by tapping a series of lights.

Alan Bradley's cubicle at ENCOM is thoroughly familiar to millions who make their livings inside partitioned squares of office dividers. Bradley's space—personalized by his popcorn popper and a "Gort Klaatu Barada Nikto" poster—was one of thousands visible in the scene where he found he had been denied access to his Tron program. Sixteen cubicles were actually constructed on Stage 4 at Disney; the hundreds of cubicles adjoining them were the products of Harrison Ellenshaw's paintbrush.

Since he gained prominence within the film industry for the thirteen matte paint-



ENCOM logo, Dean Mitzner

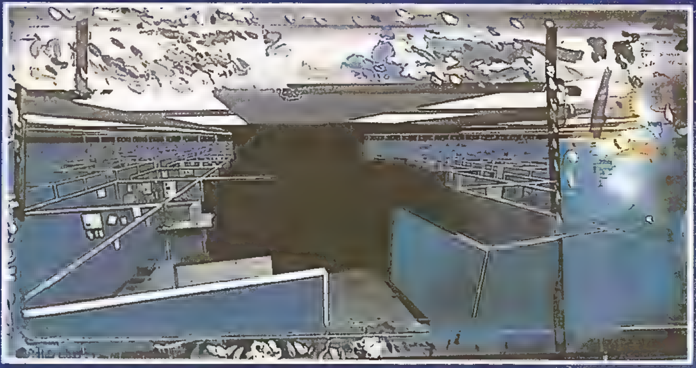


Lawrence Livermore Lab's Shiva laser bay. The blue tubes house lasers which, after building power, all concentrate into a single target area.

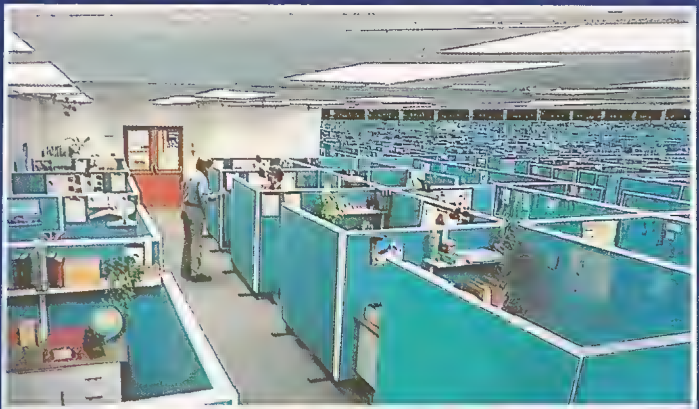
Shiva laser target area

The target area with an addition. In the center is a prop laser gun which scans Flynn.

Interior of Shiva laser bay, Lawrence Livermore Lab. Lora and Flynn break in late at night, so Flynn can use a sophisticated terminal to try to gain access to the Master Control Program.



Matte painting of the ENCOM office complex, Harrison Ellenshaw



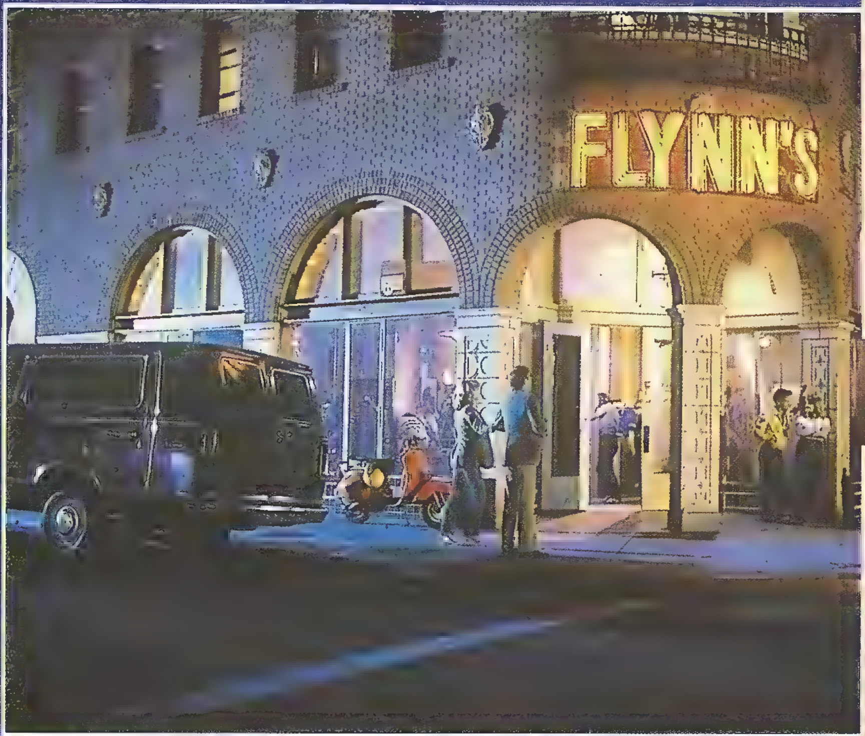
The matte painting combined with live action

Lawrence Livermore Lab.
Flynn and Lora sneak into ENCOM through rooms housing rows of computer banks.

ings he created for "Star Wars," Ellenshaw has been recognized as one of the best at a very special craft. Matte painting—the technique of joining a painting with live-action photography to add scope to a scene—is a skill requiring an artist's eye for color and perspective and a cinematographer's knowledge of photography and lighting. To create the lone matte shot in the film ("a cameo appearance" as Ellenshaw describes it), a special camera was placed overlooking the row of cubicles on the stage. Ellenshaw then made certain the picture was framed so he would have a means of visually tying together painting and live action. Once the scene was photographed, he added the matte painting to his many duties as associate producer and co-supervisor of effects.

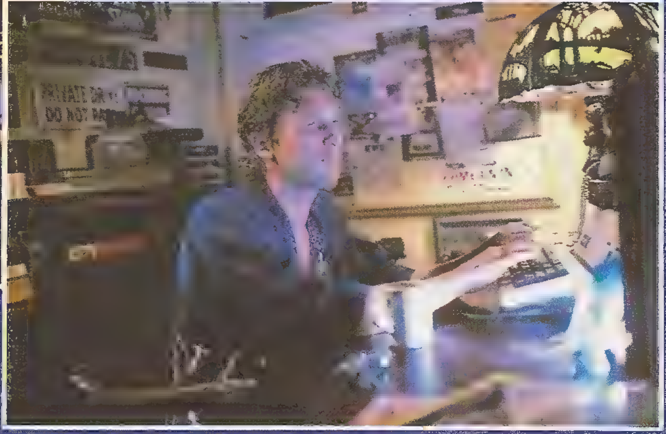
"The matte shot was obviously a very small part of my job on the picture," Ellenshaw said. "'TRON' was assembled in a modular fashion—elements would come together from background artists, scene coordinators, effects animators, computer companies—and I spent most of my time trying to see that the system flowed smoothly."

The system was one of the largest postproduction efforts in Hollywood history on a live-action film. Twenty-six camera operators, twenty scene coordinators and assistants, eight background artists, twenty effects animators, two-hundred inkers and painters, and twenty computer artists comprised the staff.



Exterior of Flynn's Arcade

Interior of Flynn's arcade



Flynn programs Clu to retrieve the data that will convict Ed Dillinger (David Warner).

5. FLYNN'S ARCADE

The vacant ground floor of an old building in Culver City, California, was the site of Flynn's arcade. Dean Mitzner and Roger Shook elected to outfit their own arcade rather than use an already-existing facility because of the control it provided the shooting company.

"When we saw the empty place with the loft, we were delighted, because it meant we could put Flynn's apartment and the arcade in the same spot. We had originally planned to shoot them in different locations, but the place we found was ideal for Steven's purposes. An added benefit was that we were able to cut down on shooting days," said Mitzner.

Initially, the arcade was to be built along the designs by Syd Mead, depicting a huge, arenalike room with games and scoreboards built into the architecture—high-tech Las Vegas. It was later decided that Flynn's place should be cluttered and organic-looking as a contrast with the rest of the picture. His backroom looked less like a computer lab than it did a mechanic's workshop.

Neon signs advertising fictitious games were placed on the walls of the arcade. The names of those games were the subjects of much brain-wracking before shooting began. Among the names coined by the "TRON" staff were: Matrix Blaster, Vice Squad, Code Wars, Strobe Zone, and Space Paranoids. Space Paranoids is the imaginary game central to the dispute between Flynn and Dillinger's ENCOM Master Control Program (MCP). It is the most popular video game in existence in the film, invented by Flynn and stolen by Dillinger and the MCP. The banners of Flynn's prize invention are a neon sign within the arcade and a gigantic billboard (designed by Peter Lloyd) overlooking the premises, both featuring John Norton's recognizers.

Sixty arcade games were hauled into the makeshift arcade along with the extras to play them. The set was consequently a seductive atmosphere for members of cast and crew. Many of them had to abandon record scores on their favorite machines when it was time to prepare a shot for the movie.

6. FLYNN

No one was more entranced by the electric atmosphere of video games than Jeff Bridges, who starred in "TRON" as Flynn (not coincidentally a character entranced with video games). Bridges was stricken during filming with a malady he labelled "Video Jones." The symptoms are: a sore trigger finger, a pocket jingling with coins, nightmares about jammed joysticks, and a tendency to catch oneself whistling the theme from Pac-Man.

"Video games are preparing us for the future. We'd better get used to looking at those screens, because we're all going to be in there soon," said Bridges, alluding to his role in the film and his view of the computer society of the future.

To prepare each day for his role as the top video-game player around, Bridges tuned up in the mornings on an arcade game he purchased for his Santa Monica home. On the set, where video games were provided for the cast to seek inspiration, Bridges was the undisputed champ, racking up scores that no person could equal.

"Each member of the cast took a different approach to his part," said writer-director Lisberger. "Jeff's was to look at it all as a real-life game, which is why, I think, he spent so much time playing the machines. He was looking for the reality he could bring to his character. And that's how it worked for him in the filming. When I would describe to the actors what would be happening in the finished film, Jeff would equate those happenings to something he had seen in a video game."

As methodical as Bridges's acting approach to "TRON" may have seemed, the truth is that acting runs in his family. Big brother Beau has a long list of credits in motion pictures and television. Jeff's first acting experience came at the age of eight on his father Lloyd's television series *Sea Hunt*.

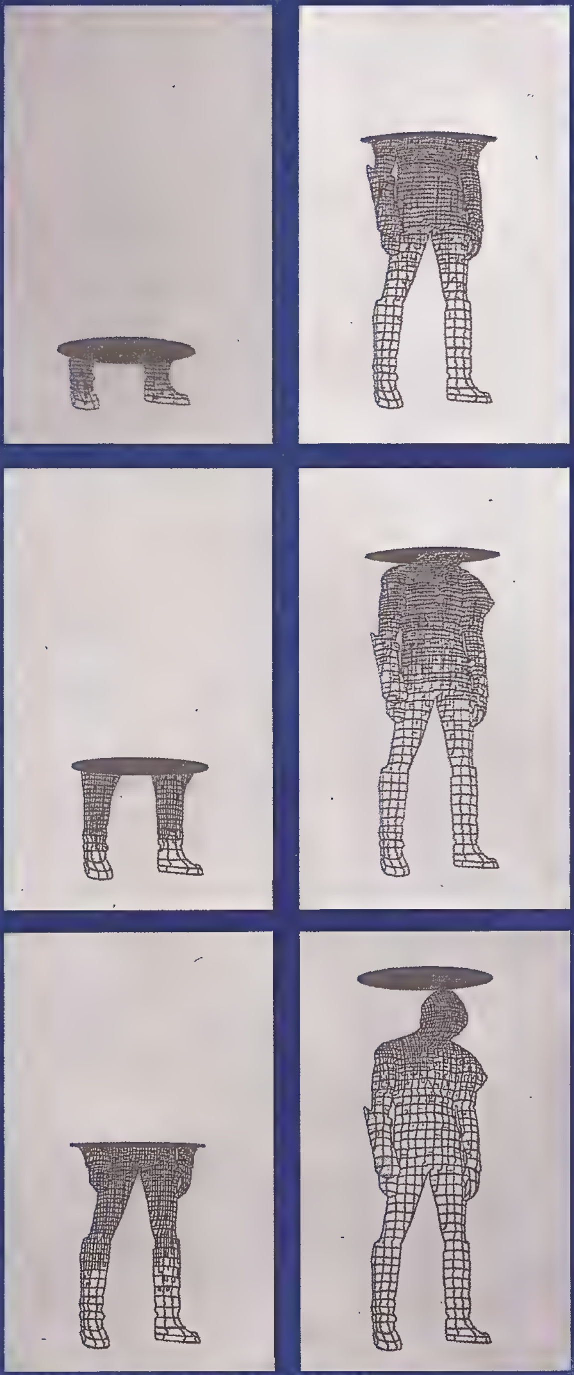
Since making his motion picture debut in 1969 in "Halls of Anger," Bridges has established a solid acting career characterized by roles in risky, nonconformist pictures, including "The Yin and Yang of Mr. Go," "Lolly Madonna," "Hearts of the West," and "Cutter's Way." He has received Academy Award nominations for his supporting roles in "The Last Picture Show" and "Thunderbolt and Lightfoot."

Clu under interrogation from the Master Control Program (MCP)

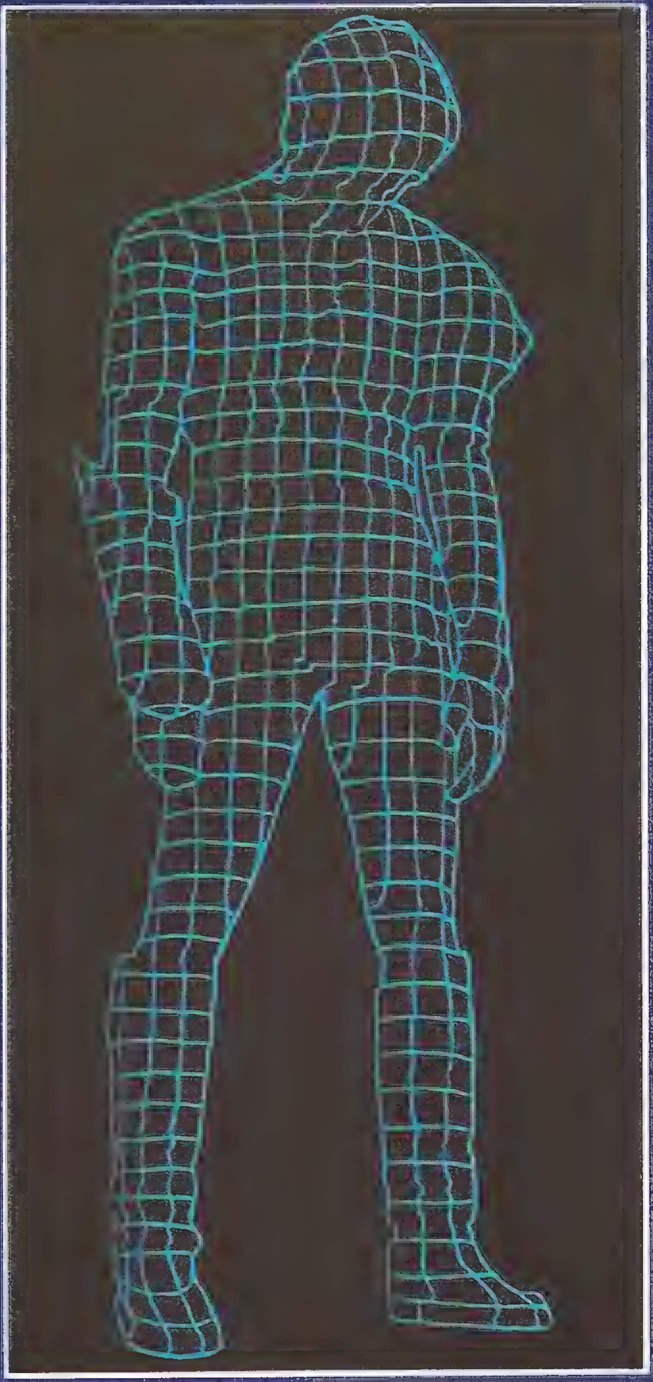
Flynn concept.
Moebius;
color by Peter Lloyd

Jeff Bridges as Clu, Flynn's program in the electronic world, is inside his tank being attacked by Recognizers.

Three test frames of Flynn as he is "digitized" by the MCP's laser. These early tests are live-action enhanced by effects animation.



Flynn "rezzing up" in the electronic world.
Animation, John Van Vliet. This is only one element
of more than a dozen used for this initial scene.



Grid animation for Flynn's arrival
in the electronic world, John Van Vliet

7. FLYNN'S TRANSITION

Robert Abel & Associates, along with effects animator John Van Vliet, designed and programmed Flynn's transition from the real world into the electronic dimension. When the MCP positioned the digitizing laser and sent a jolt through Flynn that took him apart by his DNA code, it was Van Vliet's animation that unravelled him like an electronic sweater.

"A lot of still photographs of Flynn reacting to the laser were taken at the Shiva lab, and we were essentially given the job of engineering the scene from those," explained Van Vliet, who at one time performed classified graphics animation for the Air Force and later worked for Lucasfilms on "The Empire Strikes Back," "Dragonslayer," and "Raiders of the Lost Ark." Van Vliet and his assistant, Allen Blythe, built the scene from quick cuts of twenty-five photographs in forty-five seconds.

"We first developed a rationale for what was happening, which was that Flynn would get hit by a paralyzing beam, the computer would 'measure' him by graphing his body and, with the grid acting as a cage, would take him out one section at a time," said the animator.

As the animation displayed the laser knifing into Flynn, Van Vliet replaced the photos of Flynn with ones showing an empty laser lab. The final cut in the scene was from Flynn's point of view—a blinding flash from the laser gun, which initiated the electronic roller-coaster ride into the fantasy world. This transition ride was executed by Robert Abel & Associates.

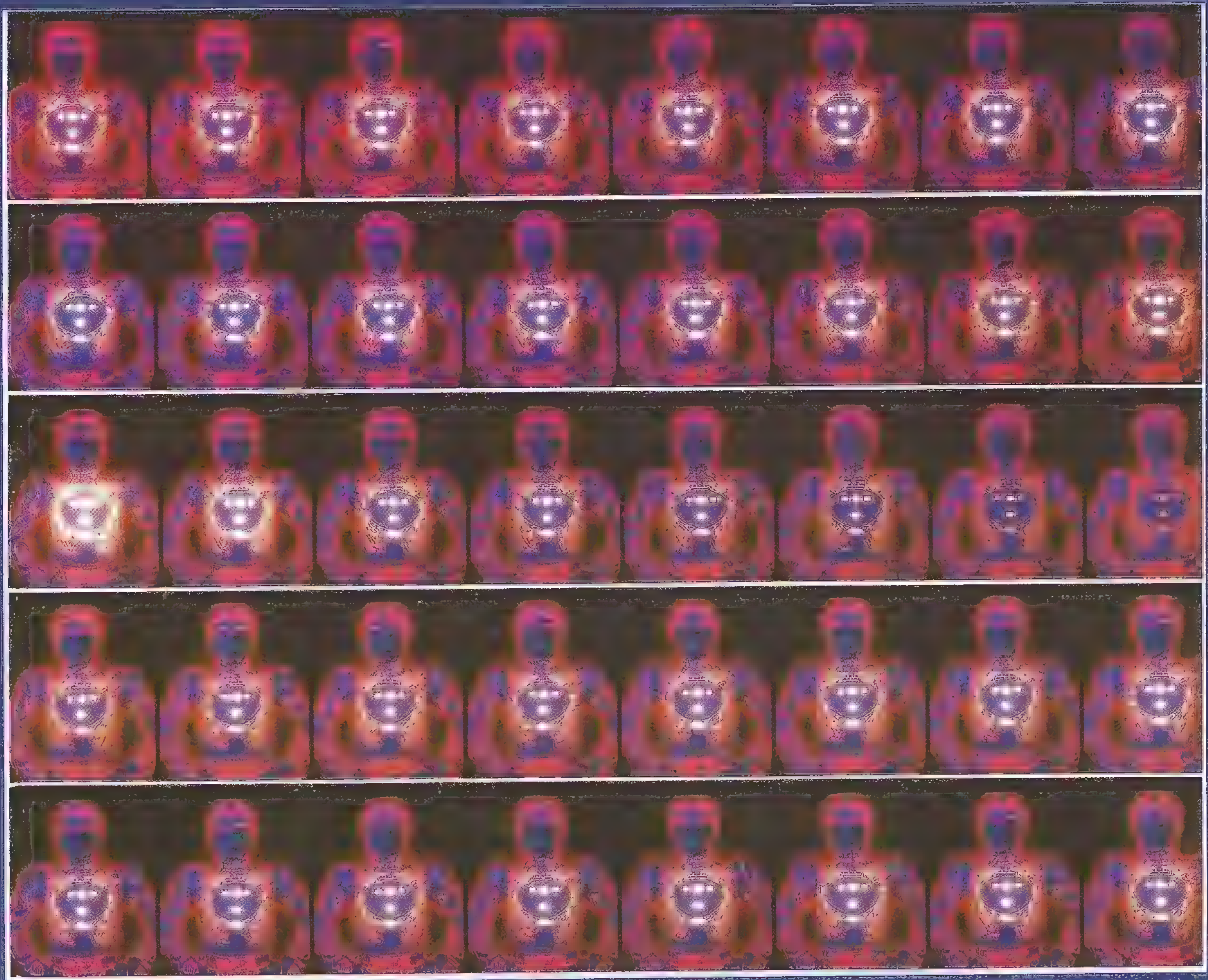
Abel, who is known as one of the top commercial-makers in the country (his accounts include Bell Telephone, Levis, and Panasonic), used a vector graphics system to construct geometric patterns of light, which were given color and shading on separate camera exposures to make the "tunnel" seem three-dimensional. Designer Kenny Mirman and technical effects artists Frank Vitz, Bill Kovacs, Richard Bailey, Rick Taylor, Tim McGovern, and Pat Kenly created the sequence with supervision from Lisberger and Richard Taylor.

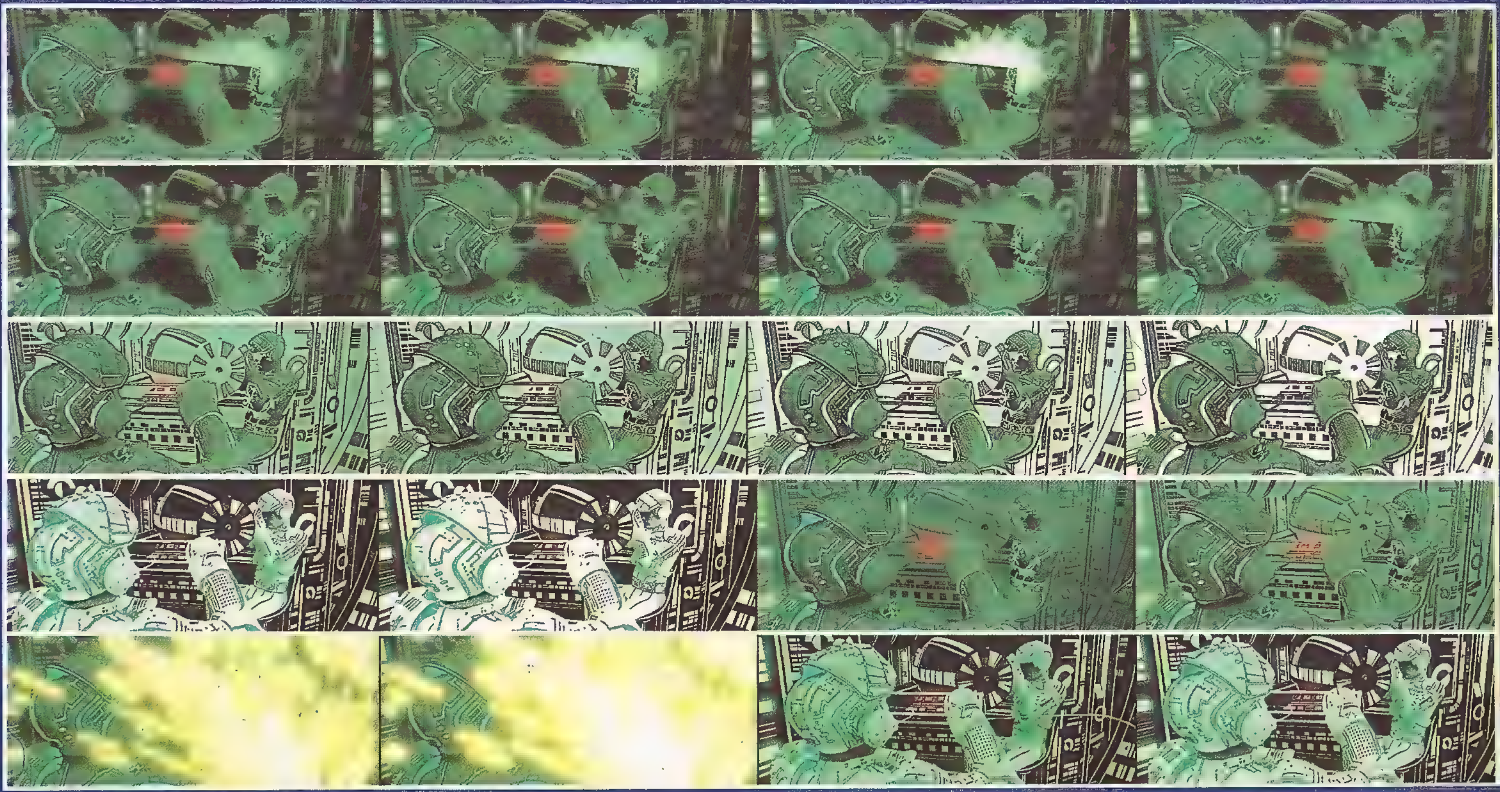
"The most difficult aspect of the transition shot," related Abel, "was that the path was not straight. We had to give it a topsy-turvy, free-fall effect, which is not always easy with a computer. In addition to the computer graphics, we included hand-drawn animation and rear projection to develop scale, detail, and coloring."

Flynn's emergence into the electronic world was also created by Van Vliet and Blythe. A curtain of light contained a shower of transmitted energy, which accumulated in a pool on the floor, then "rezzed up" into Flynn's person garbed in the circuitry of another dimension. The sequence was created by interfacing traditional cel animation with live-action photography to get the effect of light energy transforming into a solid mass.

"Building those interfaces between light effects and live action is 90 percent of our business," said Van Vliet of the effects animation staff on "TRON."

Interior of Clu's tank. In order to composite this shot, thirty-five different exposures were required for each frame.


An early wedge for the character Tron.
John Scheele, Marta Russell



Wedges for enemy tank, Deena Burkett

8. PAINTING WITH LIGHT

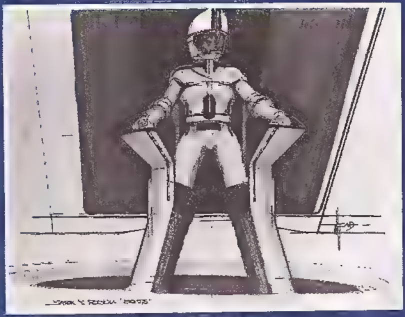
"TRON" is the first motion picture to use backlit, composite photography throughout to color characters and environments. "Painting with light" is the term given to the technique developed by Richard Taylor, who pioneered its usage in the early 1970s in television commericials for Levis and Seven-Up. Simply described, backlit photography requires that each frame of film be rephotographed against a light source. Colored filters over the camera lens and varied exposures give the characters and environments their hues while modulating the intensity of the glow. But the simplicity of the description belies the complexity of the practice.

The electronic world was originally photographed on 65mm (the addition of soundtrack makes the finished film 70mm) black-and-white film, with actors in black-and-white costumes against black backgrounds. Each frame of film was blown up into several sixteen-by-twenty-inch transparencies—some to expose circuitry, others to expose costumes, flesh tones, and eyes. These transparencies were placed, one at a time, over a light box and reshot with the appropriate color filter over the camera lens. Black hand-painted mattes were placed over a transparency when part of the frame was to be left unexposed or "held out" for a particular camera pass. More camera passes were made to add a background, either color composited from gray-tone paintings or computer-generated, to a scene. The photographic elements for compositing the colors in a frame were called an art package. The average art package contained eleven elements, but at times contained as many as thirty. In all, there were nearly 500,000 transparencies printed or painted for the film.

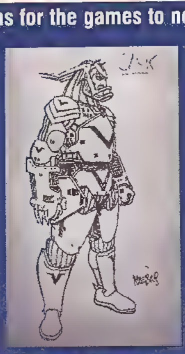
To minimize the number of scenes that went through the complex coloring process only to be cut from the film, editor Jeff Gourson and Lisberger cut the black-and-white footage as quickly as possible after the July 1981 completion of principal photography. Each individual cut of electronic-world live action was then cataloged and turned over to one of ten scene coordinators, whose responsibility it became to composite the elements that created the color.

Sark giving instructions for the games to new recruits. He holds an "identity disk

David Warner as the evil Sark receives orders from the MCP



Sark in his podium. Syd Mead



Sark, costume concept, Moebius

9. SARK

English actor David Warner was known as Jack the Ripper in the film "Time After Time," the evil genius in "Time Bandits," and many other roles as movie villains. His real-life personality comes as such a surprise. As Dillinger/Sark he is power-hungry and malicious; in real life he is polite and deferential. As Dillinger/Sark he projects a threatening screen presence; in real life he walks onto a movie set like a college professor looking for lost lecture notes.

"This character I play in 'TRON' is different in that he comes from a unique kind of world," Warner reflected, breaking the news to a listener as gently as he could. "But he has certain qualities of evil that one would expect in any villain, no matter what the setting."

Warner does not see himself as an actor who will be playing villains for the duration of his career. Indeed, his Shakespearian training suggests a versatility that can serve him through a spectrum of characters and types.

"I'm ready for a romantic comedy next," he pleaded when questioned about his succession of evil roles.

Warner was born in 1941 in Manchester, England. His schooling and family life were generally unhappy experiences, pushing him to refuge in a local repertory theater company. His training there led to his acceptance into the Royal Academy of Dramatic Art in London in 1959. Upon completing the academy's two-year curriculum, he was cast in a feature role in the movie "Tom Jones." He then rejected other film offers to join the Royal Shakespeare Company from 1962–66.

Since 1966, he has starred in such films as "Morgan," "The Ballad of Cable Hogue," "Straw Dogs," and "The Omen." He has also appeared in the television films "Masada" and "Holocaust"—for which he won an Emmy.

10. GUARDS AND CELLS

The pit cells, where Tron, Ram, and Crom were being held prisoner when Flynn materialized, were sketched in preproduction by Syd Mead as a labyrinth of geometrical walls of transparent, electric force fields. Earlier versions of the cells looked more like traditional jailhouses with solid walls and barred windows.

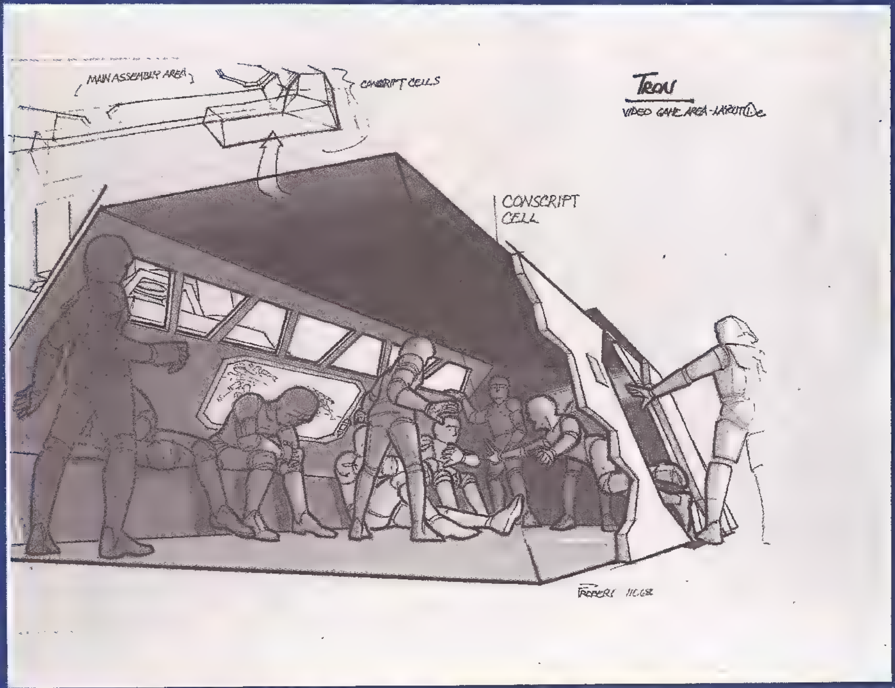
In the preproduction test filmed by Lisberger, an imprisoned program was shown reaching through the bars of his cell window and getting rapped on the knuckles by a guard. This scene evolved in the finished movie to one in which Flynn received a warning from a guard standing on the transparent ceiling of his cell. The guard tapped his staff on the ceiling and an electrical pattern crackled menacingly across the force field.

The geometrics of the Syd Mead designs were built as black sets and covered with Plexiglas for the guards to walk over. Colored vector lines accenting the shapes of the cells were added to the finished scenes by background artists supervised by Jesse Silver. Effects animation, supervised by Lee Dyer and executed by Mike Wolf, was added to produce the electrical shocks of the guards' staffs.

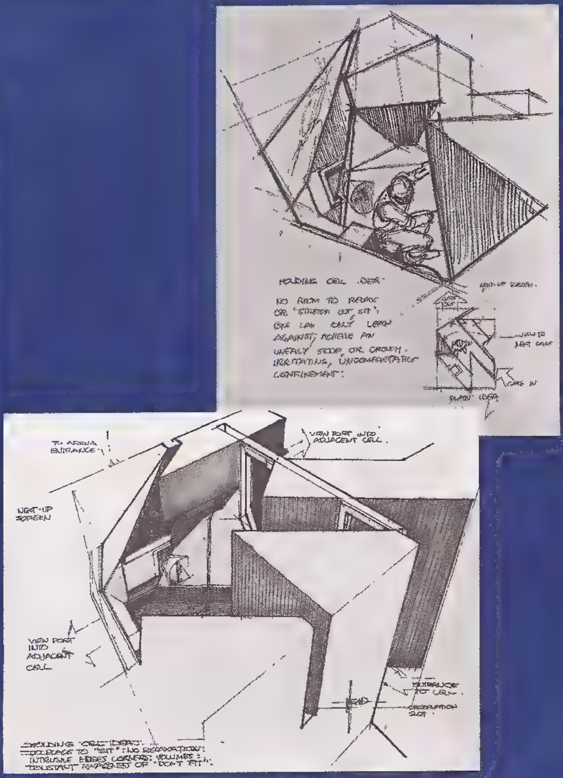
The guards' costumes were suggested by the preproduction sketches of Moebius, who envisioned outfits that were somewhat medieval in appearance. As with his designs for Sark, Moebius was apparently influenced by Richard Taylor's collection of Japanese toy robots resembling samurai warriors.

Jean "Moebius" Giraud was born in Paris in 1938. His earliest influences as an artist were American films, especially westerns and Walt Disney animations. After graduating from art school, he created the classic comic series *Lt. Blueberry*, the stylishly drawn saga of a U. S. cavalry officer. Not until Moebius accompanied Donald Kushner on a weekend drive to the Mojave Desert during preproduction of "TRON" in early 1981 did he see the sandy setting of Lt. Blueberry's adventures in real life.

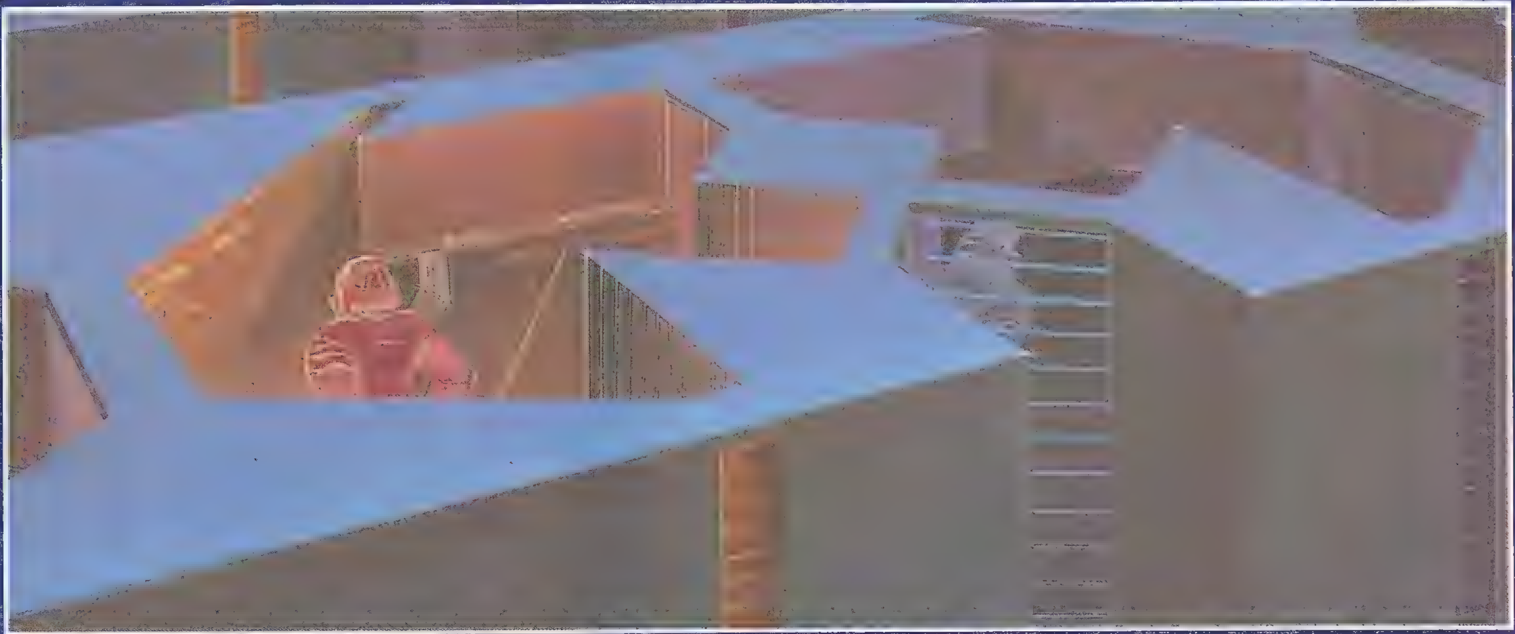
In 1974, Moebius and two friends founded the *Metal Hurlant* review, precursor of the magazine *Heavy Metal*. The artist has published two popular anthologies of his work and has collaborated on two previous film projects: "Dune" and "Alien." A nonconformist to the tip of his Magic Marker, Moebius is a devout vegetarian who lives with his wife and two children in a windmill in the Pyrenees Mountains of southern France.

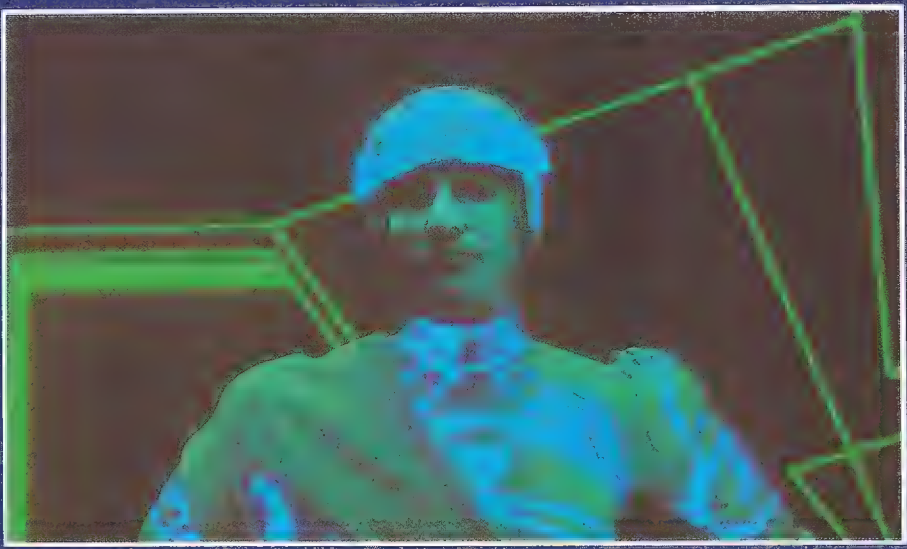


Early concept of pit cells. Andy Probert

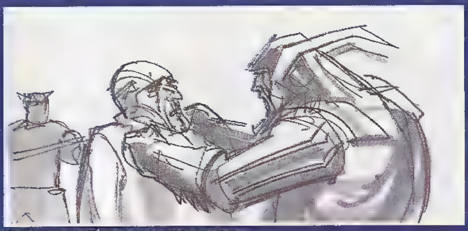

HOLDING CELL IDEA
NO ROOM TO RELAX OR "STRETCH OUT SIT"; ONE CAN ONLY LEAN AGAINST; ACHIEVE AN UNEASY STOOP OR CROUCH. IRRITATING, UNCOMFORTABLE CONFINEMENT.
NEXT-UP SCREEN.
VIEW TO NEXT CELL
GATE IN
PLAN IDEA
TO ARENA ENTRANCE
VIEW PORT INTO ADJACENT CELL.
NEXT-UP SCREEN
VIEW PORT INTO ADJACENT CELL
ENTRANCE TO CELL
OBSERVATION SLOT
MEAD
HOLDING "CELL" IDEA:
NO PLACE TO "SIT"; NO RELAXATION;
INTRUSIVE EDGES, CORNERS, VOLUMES;
CONSTANT AWARENESS OF "DON'T FIT".

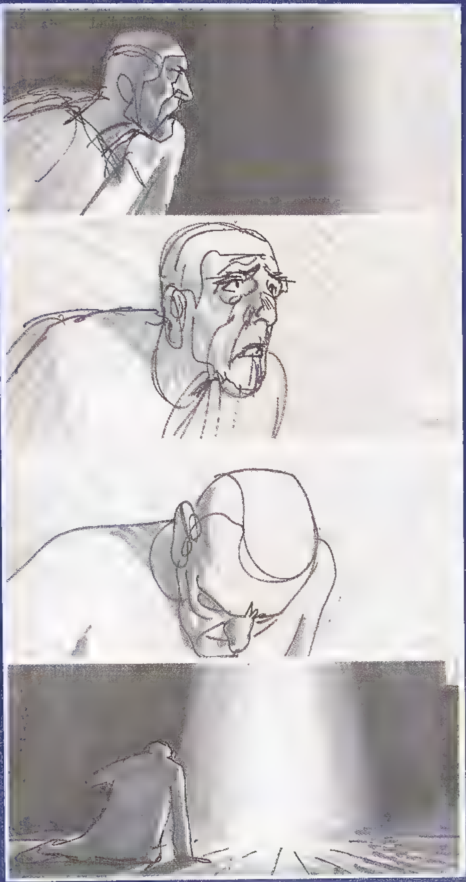
Sketches for the pit cells by Syd Mead.
The concept of one conscript per cell with force fields between reinforced a feeling of discomfort and confinement.


Pit cell illustration (detail). Peter Lloyd from a Syd Mead design


Flynn inside a pit cell

A guard designed by Moebius


Sark and Dumont , Moebius


Dumont inside the MCP, Moebius

11. THE CARRIER

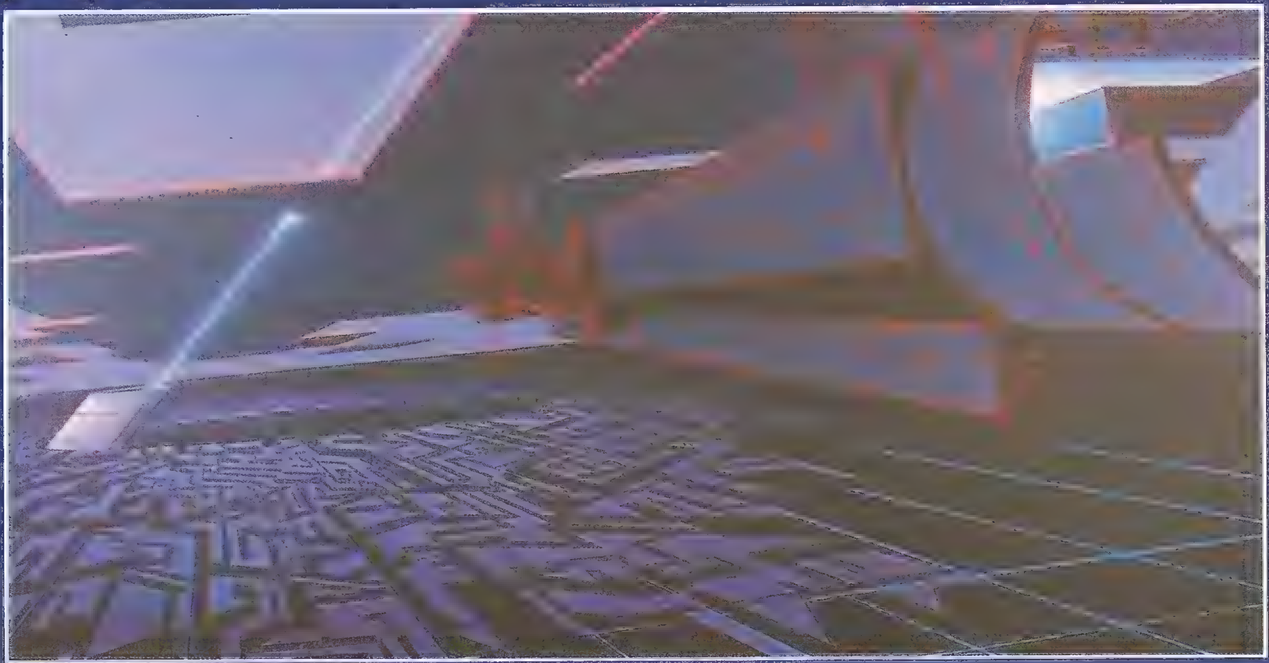
Sark's carrier, based on designs by Syd Mead, was created by Information International Inc. (Triple-I). Triple-I is one of a handful of American companies capable of creating three-dimensional CGI—a technique that replaces the traditional filming of models and miniatures. Of the four computer companies contributing to the film, Triple-I was able to program the most information into a frame of film, thus enabling them to create highly complex and textured images.

"Each company was able to give us a different look with their graphics, which, I think, is important to the overall scheme of the picture," said producer Kushner. "Triple-I did the vehicles and backgrounds that required a lot of detail."

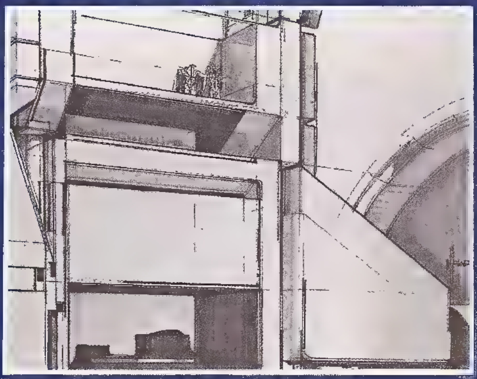
The carrier was a stylized version of a modern aircraft carrier, one that would float through the sky rather than water. With Mead's renderings and Peter Lloyd's color styling, the first step for Triple-I was to create a *data base* for the carrier. This was done by computer artist Art Durinski, who plotted the carrier on graph paper from three perspectives—top, side, and front views—then "digitized" that information by entering the carrier in computer memory as an assemblage of polygonal shapes. The resulting image was a "wire frame" drawing of the object which could be manipulated in three dimensions. The carrier's data base was completed by programming its color and texture. This was done by assigning numerical values to each point of light—called *pixels*—on a high-resolution monitor containing up to twenty million pixels.

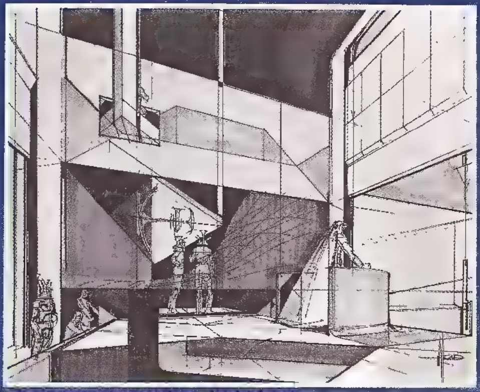
Once the data base was completed, Triple-I artists Larry Malone, Craig Reynolds, Bill Dungan, and Jeremy Schwartz set about creating the *movie file* for the carrier—the computer's instructions to the object over a period of time. The movement of the carrier through a scene was charted by computer-image choreographers Bill Kroyer and Jerry Reese and programmed by Triple-I artists. If the movement of the wire frame image—a "motion test"—was approved by Lisberger and the creative team, Triple-I was given permission to finish the scene in full resolution. One frame of fully resolved CGI can contain over 75 million calculations.

"The beauty of computer simulation is that you are not bound by physical laws," said Richard Taylor. "Each time you calculate a scene you're creating your own laws of physics. There's no limit to the point of view of the camera, there's no limit to the way an object can move or metamorphose. One of the great beauties of 'TRON' is that we can show an audience something they've never seen before. A lot of that is due to the computer simulation."

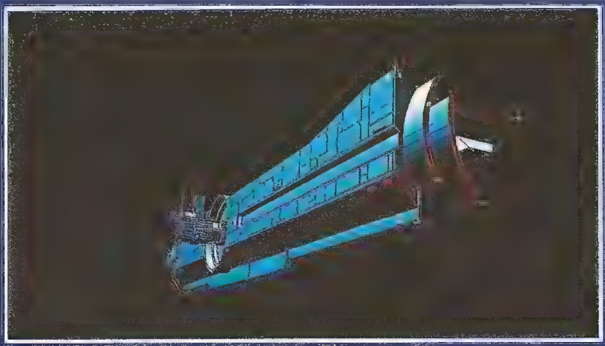


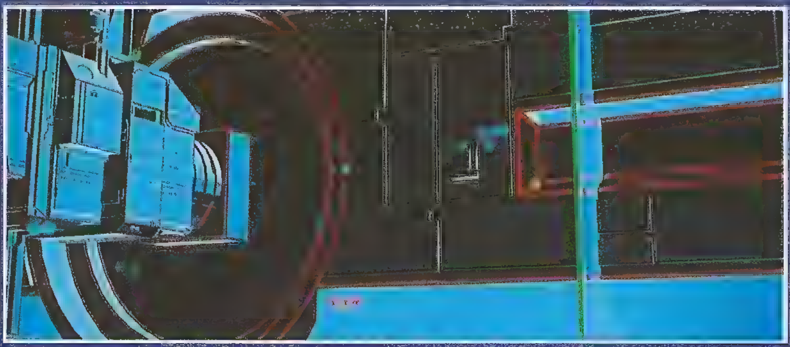
Peter Lloyd's preproduction concept of Sark's carrier, based on Syd Mead's original design

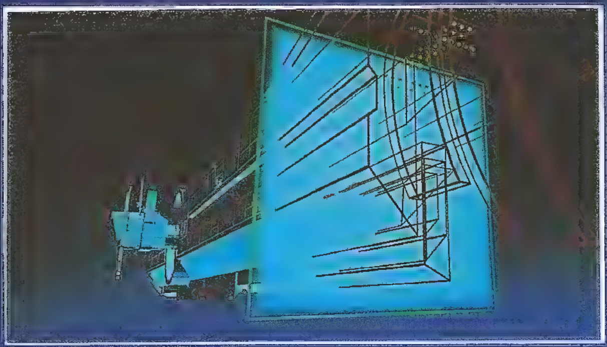

Detail of the carrier bridge, Syd Mead

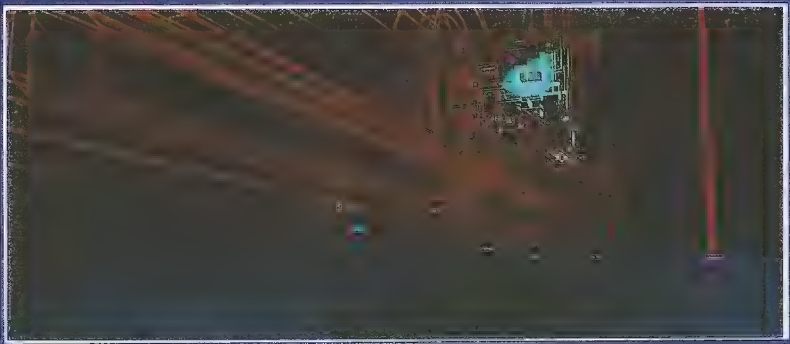

Interior carrier bridge, Syd Mead

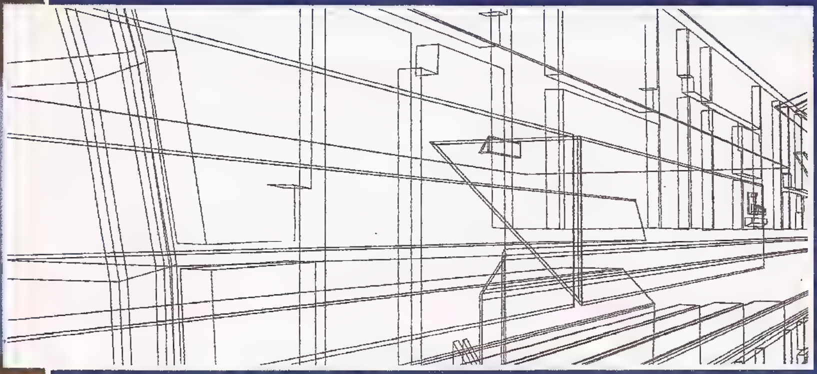
Detail of Sark's carrier, Triple-I

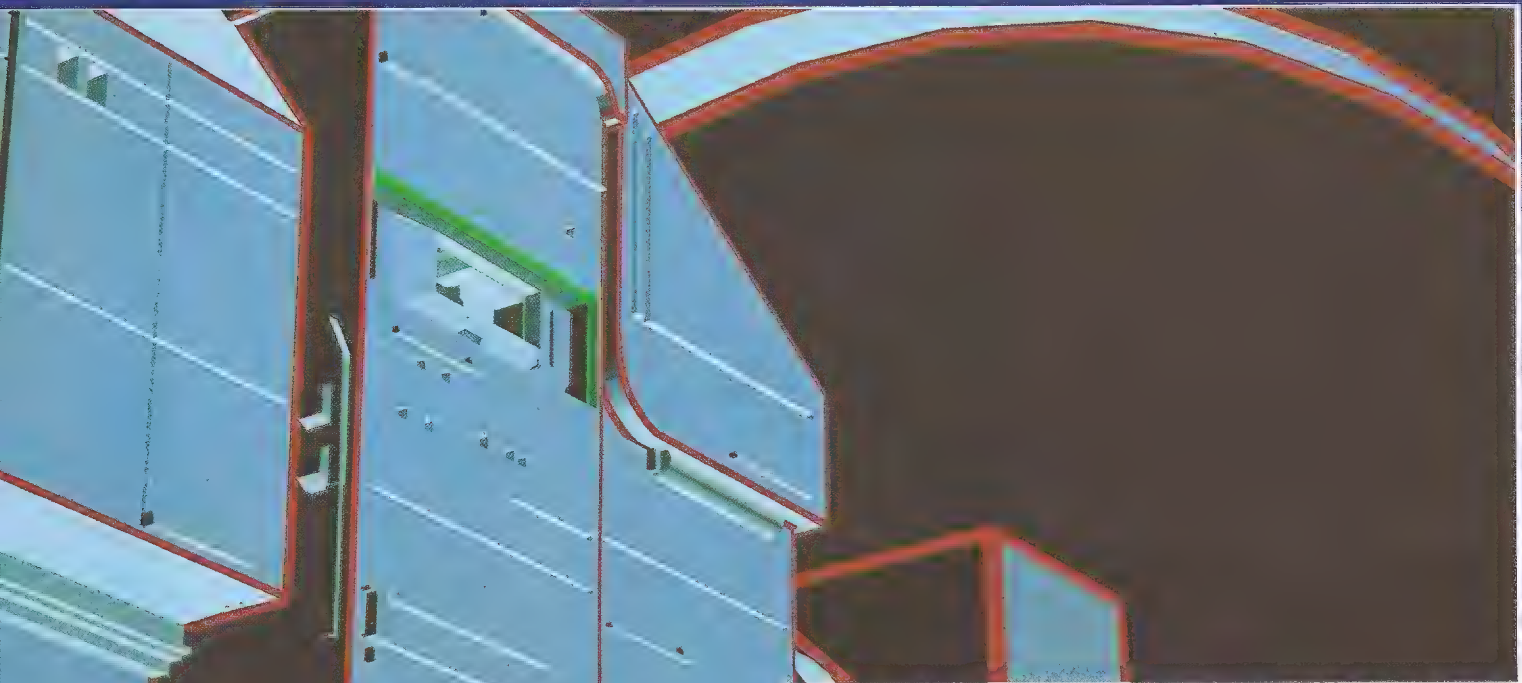

Sark's carrier as produced by Triple-I's computer

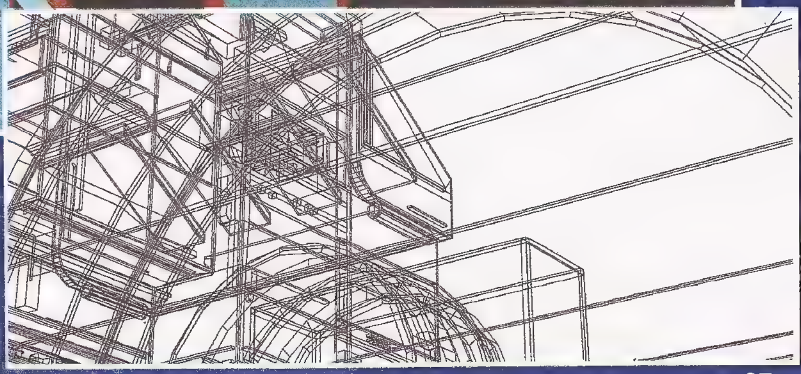

The bridge "pod" of Sark's carrier, Triple-I


Carrier de-rezzing, Triple-I


De-rezzing carrier approaching the MCP, Triple-I

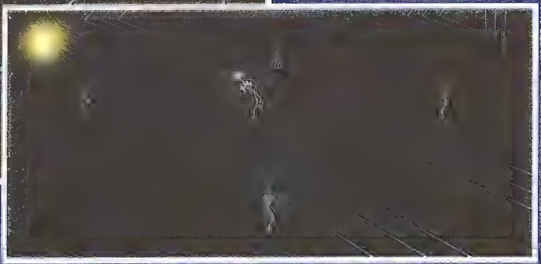






Detail of the bridge "pod" of Sark's carrier. Triple-I

Tron defends himself against a warrior's disk. Effects animation to produce the "hit," Michael Wolf. Background design, Peter Lloyd; composite, Marta Russell



The disk game. Tron (center) must battle four enemy warriors at once. Backlight compositing and effects animation enhancement are used.

12. DISK FIGHTS

The disk fight in which Tron fended off the deadly tosses of four enemy programs was the product of an athletic actor, effects animation, and an identity disk "coach."

The athletic actor was Bruce Boxleitner, who used his agility to give believability to a scene with few visual cues in the live-action filming. What cues he had were provided by Sam Schatz, a former national champion frisbee player who choreographed the identity disk fights. Schatz would determine how a fight was to be staged and would position the actors accordingly. Impact explosions and trailing edges of light from the disks were animated by Lee Dyer's team of effects artists.

Schatz was just developing his repertoire of frisbee tricks—including the double-overhand wrist flip, the toenail delay, and thumb-shooting—when disk-throwing became a national passion in the mid 1970s. The ambidextrous son of a sculptor from Bethlehem, Pennsylvania, was soon performing at halftime of professional football and basketball games and touring nationally for a suntan lotion company. He has since retired from the pro frisbee circuit for a career in carpentry, but he will still sail the saucers for a fee. Schatz was the "expert warrior" who performed a series of around-the-neck tosses and between-the-legs catches in the preproduction test. Working with stunt coordinator Dick Butler, he also performed many of the disk stunts in the movie.

13. TRON

Bruce Boxleitner very nearly turned down the role of Tron.

"I had just finished playing a cowboy in a movie-of-the-week," he recalled. "I was enjoying all the outdoor activity, the riding, the fighting. Those people who helped tame the West are my heroes. So when the script for 'TRON,' a film that would be shot almost entirely on sound stages, came to me, my feeling was that I wouldn't want to be cooped up all that time."

Boxleitner's wife Kitty prevailed on him to take the part. "She said I'd better reread the script, that it was one of those films that you only see once or twice in a career," he said.

At second reading, the star could see the possibilities. He saw in particular that the hero in the film was very much like the strong, masculine types who stood for law and order in the Old West. There is an exchange in the film in which Alan accuses Flynn of playing "space cowboy." In reality, Boxleitner's character, Tron, was the cowboy.

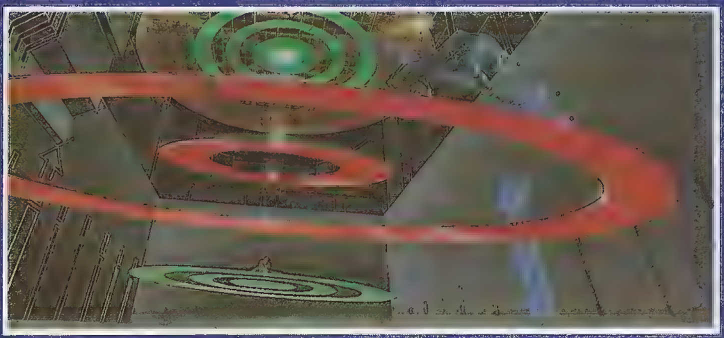
A graduate of the prestigious Goodman Theater in Chicago, Boxleitner parlayed his early experience on the stage into steady employment on television beginning in 1972 with a couple of lines on *The Mary Tyler Moore Show*. He has been a regular on the television series *How the West Was Won* and has starred in the films "The Gambler," "East of Eden," and "Fly Away Home." His lone feature film appearance prior to "TRON" was with James Coburn and Omar Sharif in "The Baltimore Bullet."

14. RING GAME

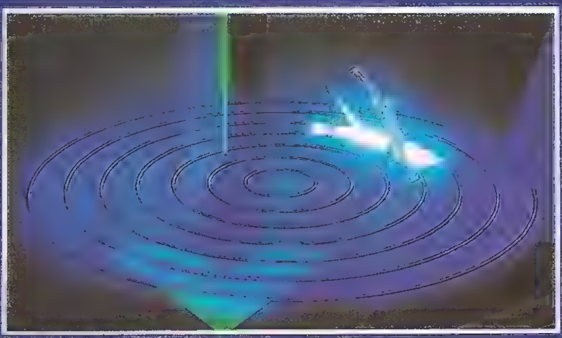
The ring game is a high-tech variation of jai alai, a means of combat in the video-game arena. The game is played by two combatants on rings floating like twin helipads in midair. Above and between the rings is a large mirror, off which the opponents angle pellets of energy, which, if not caught, disintegrate a ring beneath the player or on the player himself.

Peter Lloyd airbrushed a detailed design for the ring game in action, a piece of art that was used as the basis for the scene in the film. The ring game was the one scene in the movie where two good programs were forced into conflict. All other battles took place between the blue and red warriors. The ring game was one of ten fully rendered paintings that Lloyd created for the movie. The remainder of his preproduction art was done in color on five-by-seven-inch sheets called "thumbnails" and used as color styling for many of the scenes. Lloyd was also instrumental in supervising background coloring and design for the hand-drawn backgrounds, which were rendered in gray-tone patterns and colored by backlighting the artwork along with the other live-action elements in a scene.

One of the top commercial artists in the country, Peter Lloyd made his motion picture debut with "TRON," and contributed heavily to the styling of the environments. The artist—whose portfolio includes work for Rod Stewart's record albums, Levis' jeans, and *Playboy* magazine—is optimistic about the tools that high technology provides for artists: "'TRON' is the beginning. You'll be amazed at where we go from here," he commented.



The ring game, conceived by Moebius.
This particular preproduction illustration is by Peter Lloyd



A warrior misses the electronic pellet, which de-rezzes the ring it hits.

Sketch of electronic cave interior, Harrison Ellenshaw

Background for the exterior of the cave. Design, Jesse Silver; painting, Peter Mueller; composite, Marta Russell

A console on the bridge of Sark's carrier. Design, Jesse Silver; painting, Tom Woodington; composite, Marta Russell

Background composite test for Yori's apartment. Design by Peter Lloyd from a Syd Mead concept. Painting, Peter Mueller; composite, Marta Russell

Electronic world cityscape with effects animation added as the domains "rezz-up." Still, Triple-I; animation, Lee Dyer; composite, Marta Russell

15. CROM AND RAM

Peter Jurasik, who starred as Crom, an out-of-shape banking program who dies in the ring game with Flynn, is an accomplished character actor with credits in film, television, and the stage.

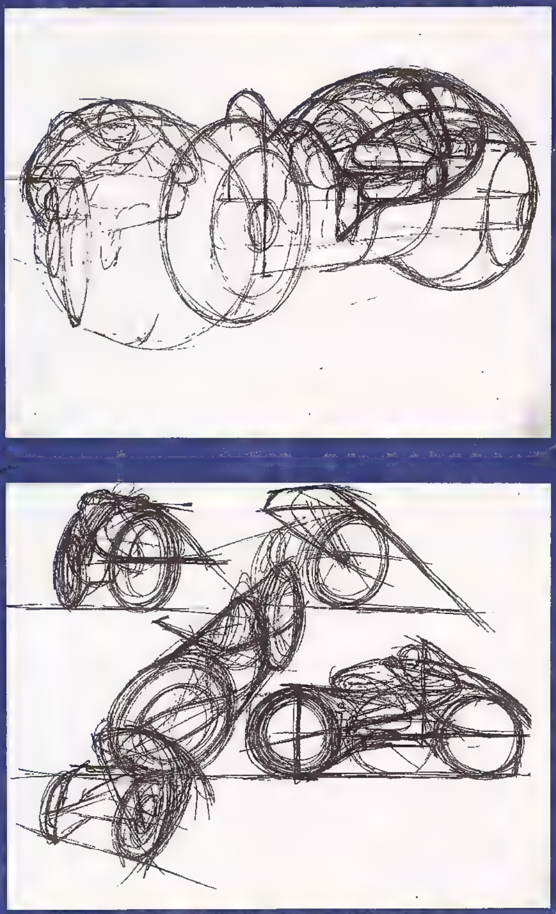
Originally from New York City, Jurasik graduated from the University of New Hampshire in 1972, performed with repertory theater groups throughout New England, then landed a leading role in the Broadway production of *Godspell*. In 1977, he moved to Los Angeles and became part of the comedy repertory company known as The Village Idiots. He has since appeared in commercials for Budweiser, *Time* magazine, and Allstate insurance. He has been a regular on the television shows *The White Shadow*, *Paris*, and *Barney Miller*. He has also starred in the telefilm "Born Again" and the feature film "Straight Time."

Daniel Shor starred as Ram, the imprisoned program who broke off the game grid with Flynn and Tron. A native of New York City, Shor was educated at Northwestern University and the London Academy of Music and Dramatic Art. In 1975, he appeared in the Broadway production of *Godspell*, and from there joined the national touring company of *Equus*.

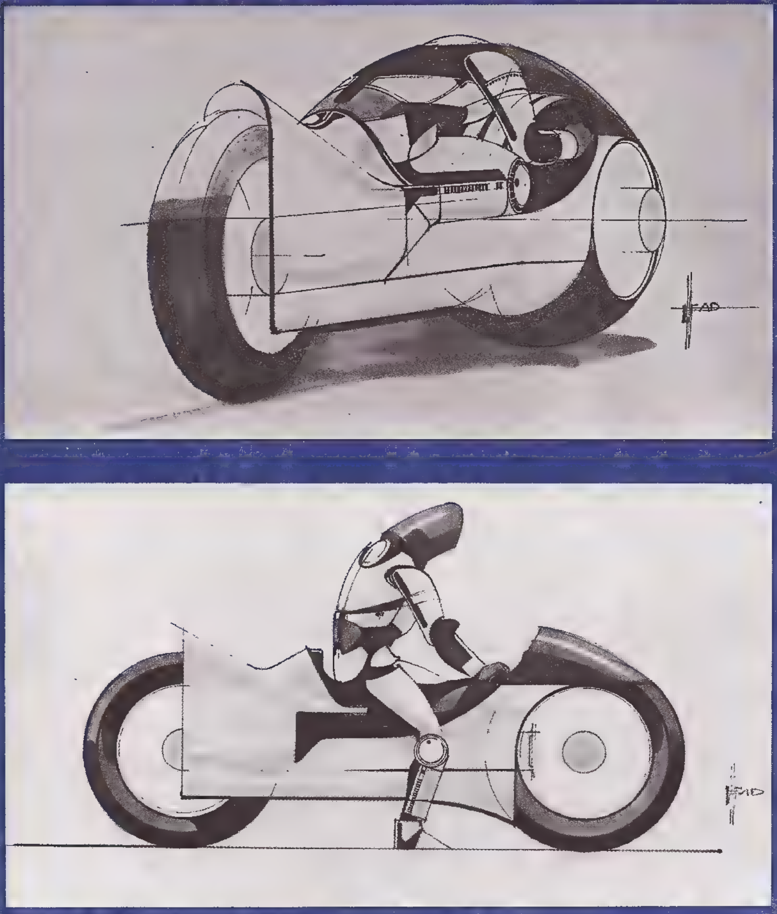
A resident of Los Angeles since 1977, Shor has appeared in twelve television movies, including "Friendly Fire," "The Boy Who Drank Too Much," and "A Rumor of War." He has starred in the feature films "Wise Blood," "Back Roads," and "Out of the Shadows." He is a conga drummer with a group called the Latin Jazz Band, and he has produced a play, *The Sport of My Mad Mother*, for the Los Angeles stage.

Peter Jurasik as Crom hangs on for his life in the ring game.

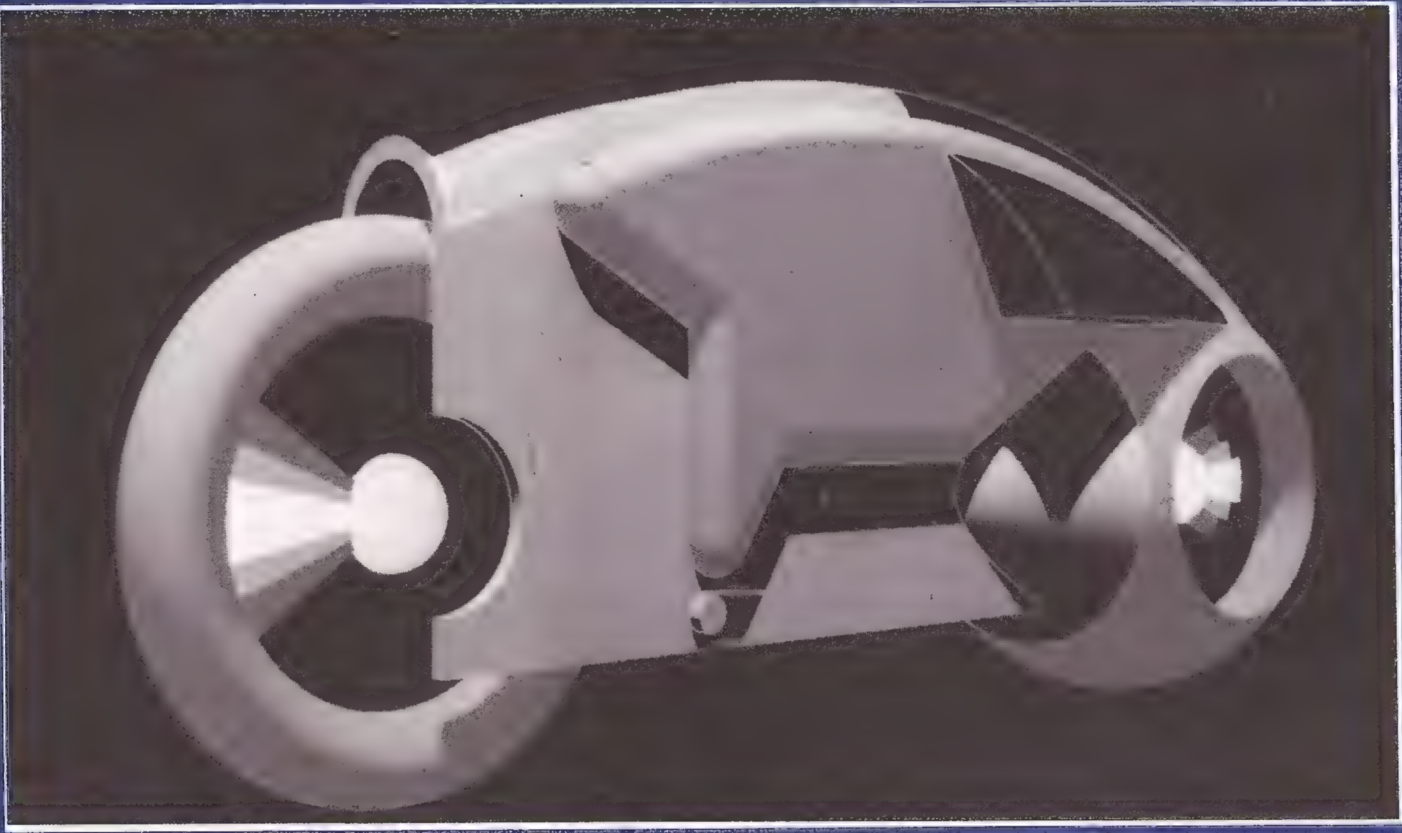
Daniel Shor, Ram, the actuarial program who escapes with Tron and Flynn



Thumbnail sketches of lightcycles, Syd Mead



Final lightcycle designs, Syd Mead



Early MAGI lightcycle test

16. LIGHTCYCLES

Syd Mead's designs were the basis for the lightcycles, which were built with computer simulation by the Mathematical Applications Group Inc. (MAGI) of Elmsford, NY. Like Triple-I and Digital Effects, MAGI uses a raster graphics system to create three-dimensional images. However, their method of storing data is different. Instead of mapping thousands of polygons over the surface of an object, MAGI's system, called "Synthavision," utilizes twenty-three basic three-dimensional solids, called "geometric primitives." These geometrical shapes, combined in intricate patterns, create a solid object. Synthavision is among the most maneuverable and quickly computed CGI software on the market, and MAGI is the largest contributor of computer art to the movie. Besides the lightcycles, their work includes the recognizers, the tanks, and several shots of Sark's carrier.

The creative director of the MAGI staff, which generated the astonishingly fluid computer scenarios in "TRON," was Larry Elin, who has been with the company since 1973. Elin came to MAGI with a degree in film & television from Syracuse University and no experience with computers.

"Until we got the impetus to do it with 'TRON,' the Synthavision code had been unchanged since 1972," Elin said. "MAGI was falling behind in a field it had originated. With 'TRON' there was a need to improve the code, to update our equipment. We can do things now that weren't possible when we began the picture.

"When we construct an image, we don't think of it as simply building a single object," Elin continued. "What we do is create an entire three-dimensional environment. Our filmmaking consists of taking pictures of that environment as we travel through it."

One of the improvements in the MAGI system was the means by which artists at Disney in Burbank, California, collaborated with artists at MAGI on the opposite coast. Weeks into the postproduction phase of the picture, it was apparent that too much time was lost between the coasts as a scene evolved at MAGI, was corrected at Disney, then refilmed at MAGI. Elin and his staff—animators Chris Wedge and Nancy Campi and computer expert John Beech—had to program low-resolution motion tests, film them, ship them to California, get corrections made by choreographers Bill Kroyer and Jerry Rees, get them returned, then reprogram and refilm them. Elapsed time: four days.

Phil Mittelman of MAGI and Donald Kushner gave the exchange of information between East and West the boost it needed with the installation of a computer terminal at Disney identical to the one generating images at MAGI. Kroyer and Rees could now instantly see the scenes being developed on the East Coast by transmissions over a telephone line. This immediate preview of the computer art saved three working days on each scene.

"Without the terminal at Disney," stated Kroyer, "it would have been physically impossible to complete the scenes we needed for the movie."

Bill Kroyer and Jerry Rees, computer-image choreographers for "TRON," both approached their work from backgrounds as character animators. A self-taught animator who studied journalism in Northwestern University, Kroyer produced educational films in Chicago, spent two years in Los Angeles animating television commercials, joined Disney as an assistant animator on "The Fox and the Hound," and moved to Lisberger Studios as an animator on "Animalympics." He sporadically worked on the early "TRON" experiments with Lisberger.

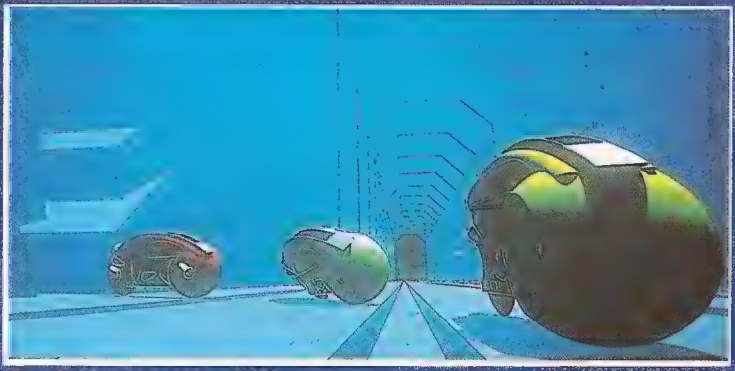
Rees submitted his first animation test to Disney when he was sixteen years old. In 1976, he was in the first group to enroll in the California Institute of the Arts, a school that has since become a training ground for some of the world's top young artists. He began working at Disney in 1977 and, like Kroyer, joined the crew of "TRON" when Disney took on the production.

Kroyer and Rees also worked with Moebius to make the storyboards for much of the film. The biggest challenge, however, was the chance to animate with computers.

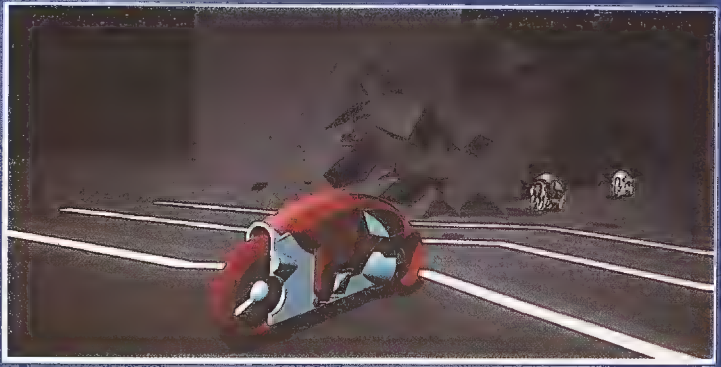
"All the principles of traditional animation apply, but this work was especially satisfying because we were working in an entirely different kind of medium," noted Kroyer.

"What we've created has a completely new look. It's not an imitation of anything, and it's not often that you get to say that as an artist," Rees added.

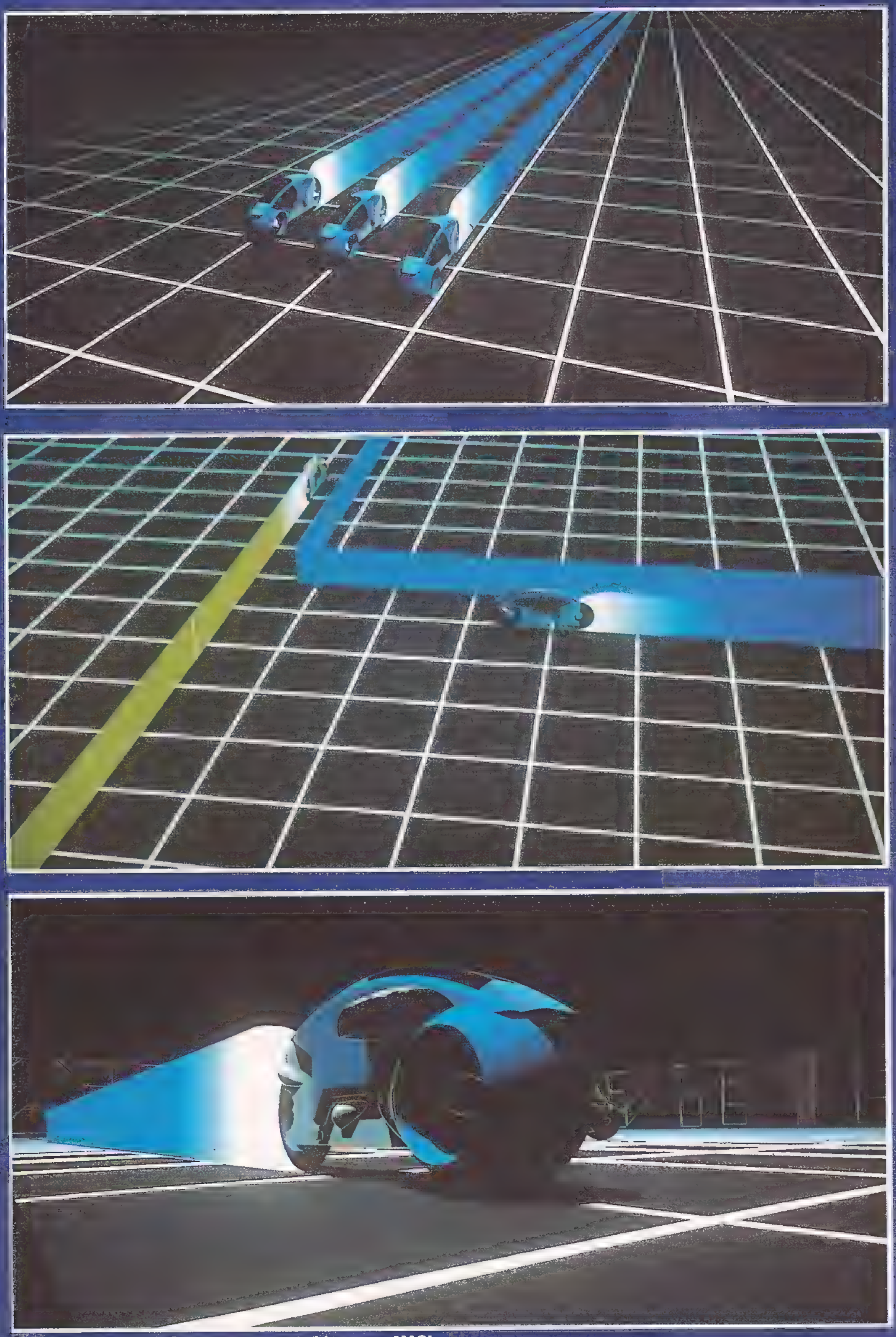
Lightcycles, MAGI. The "good programs" have red, orange, yellow cycles; all opposing are blue.



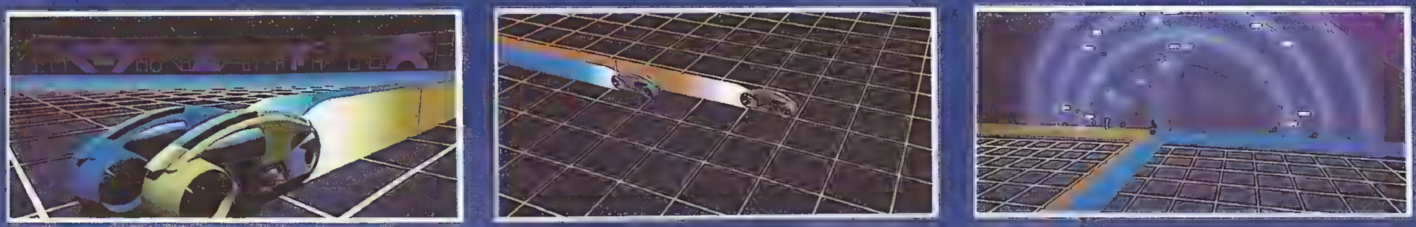
Three lightcycles escape, MAGI



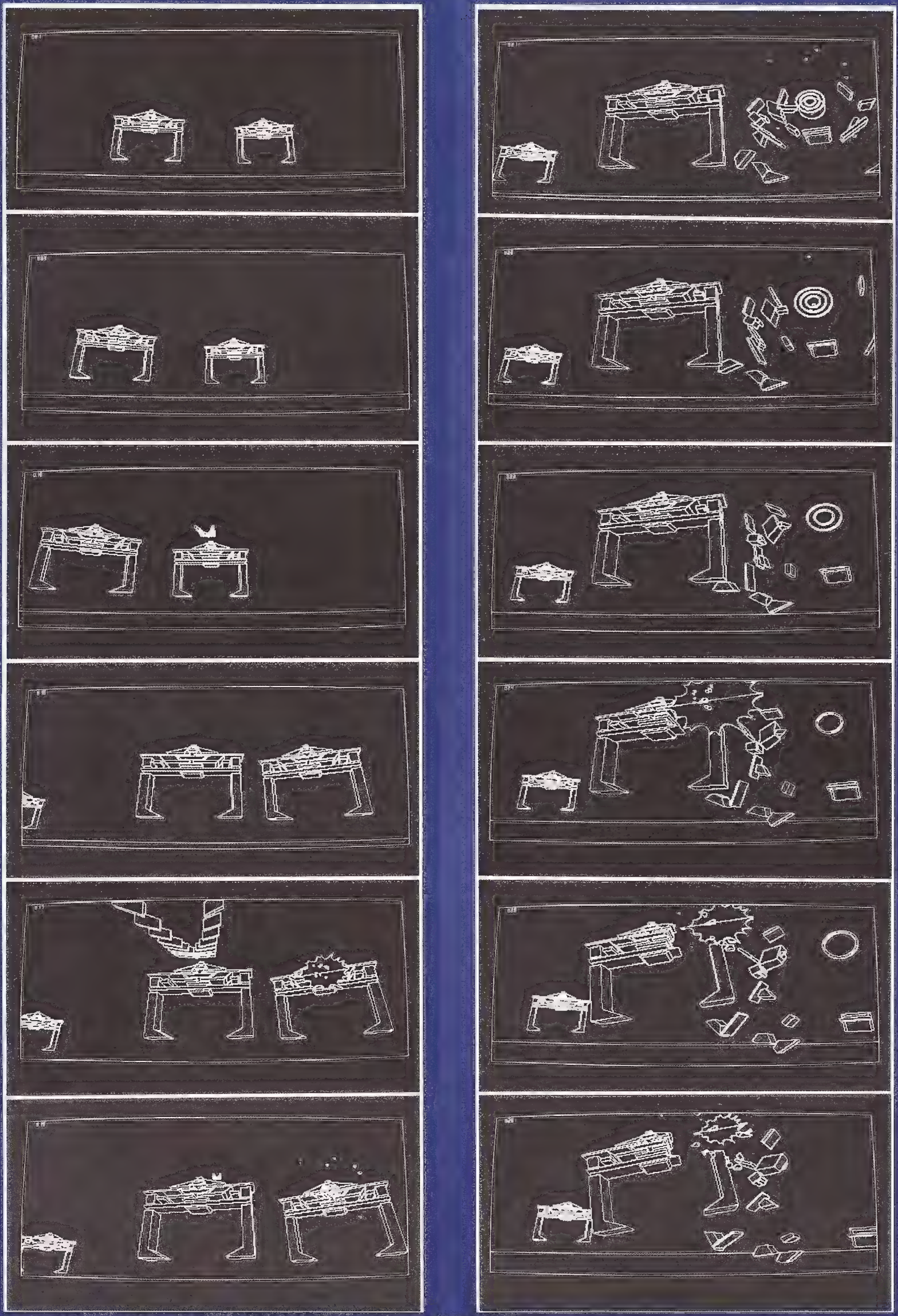
A lightcycle crashes into the game arena wall, MAGI



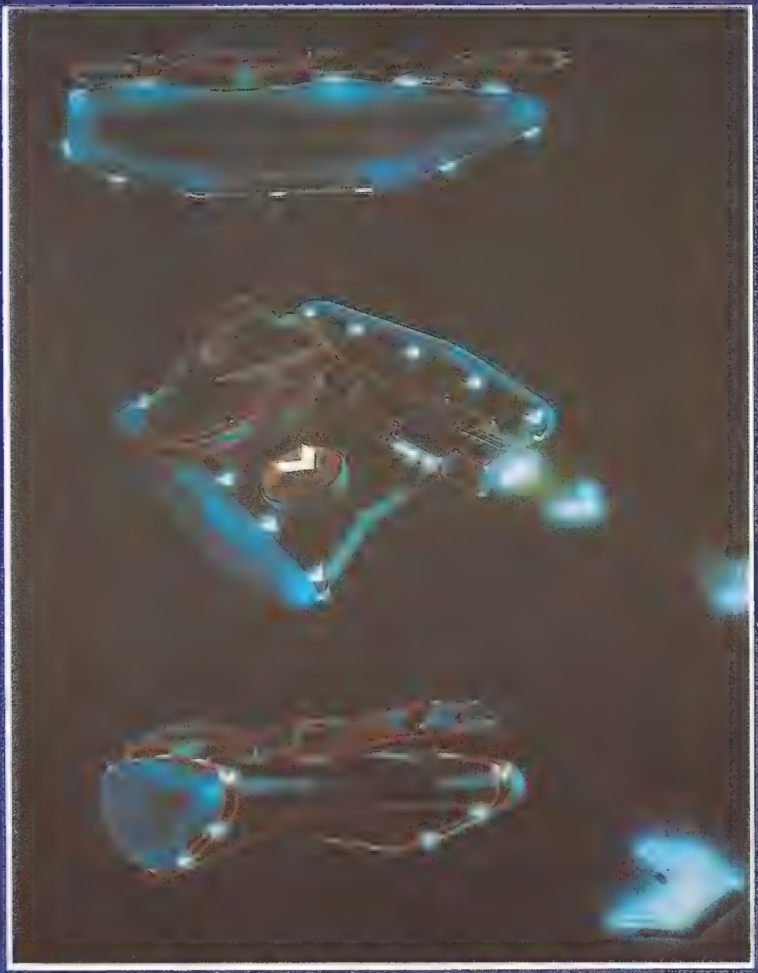
The lightcycle game. Computer-generated imagery, MAGI.



Test frames from the lightcycle game, MAGI.

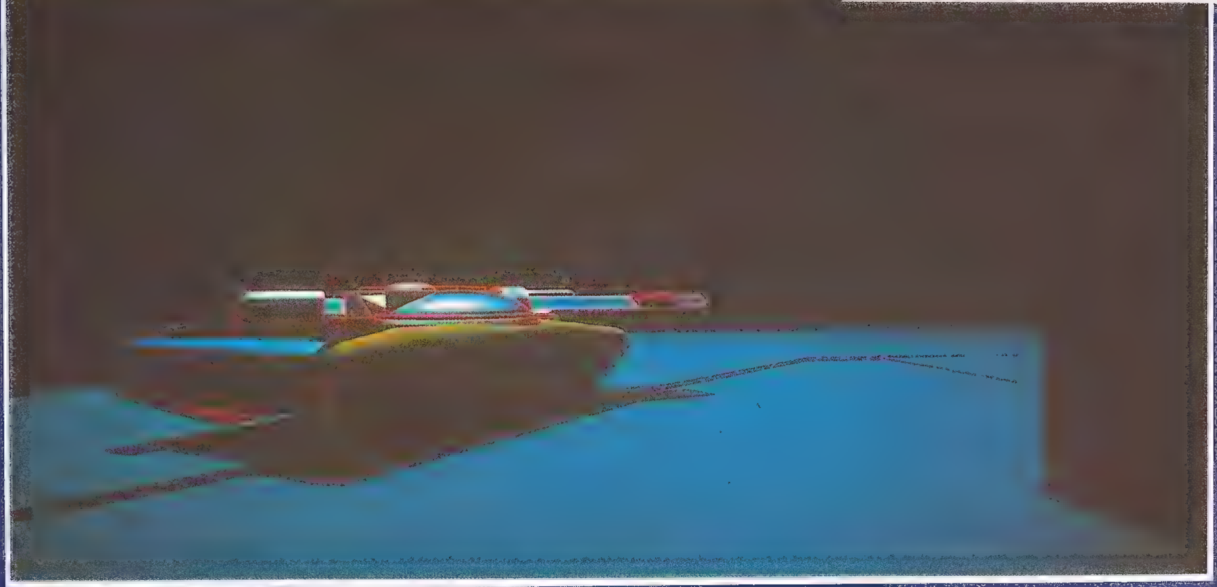


Low-resolution recognizers attacked by Clu's tank. These images were transmitted from MAGI in Elmsford, NY, by telephone to the Chromatics terminal at Disney Studios. The scene in its low-resolution form was then approved or modified by Jerry Rees or Bill Kroyer before final filming by MAGI.

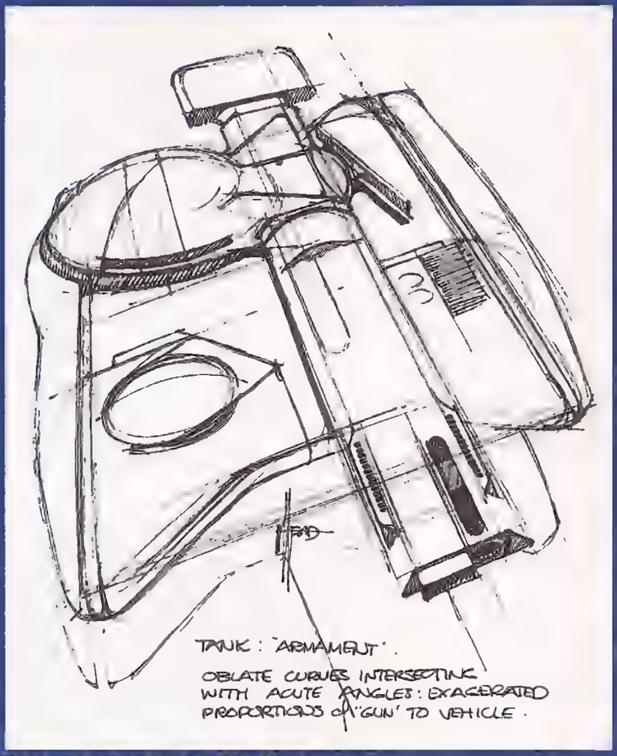


Electronic tank renderings by Syd Mead, colored by Peter Lloyd

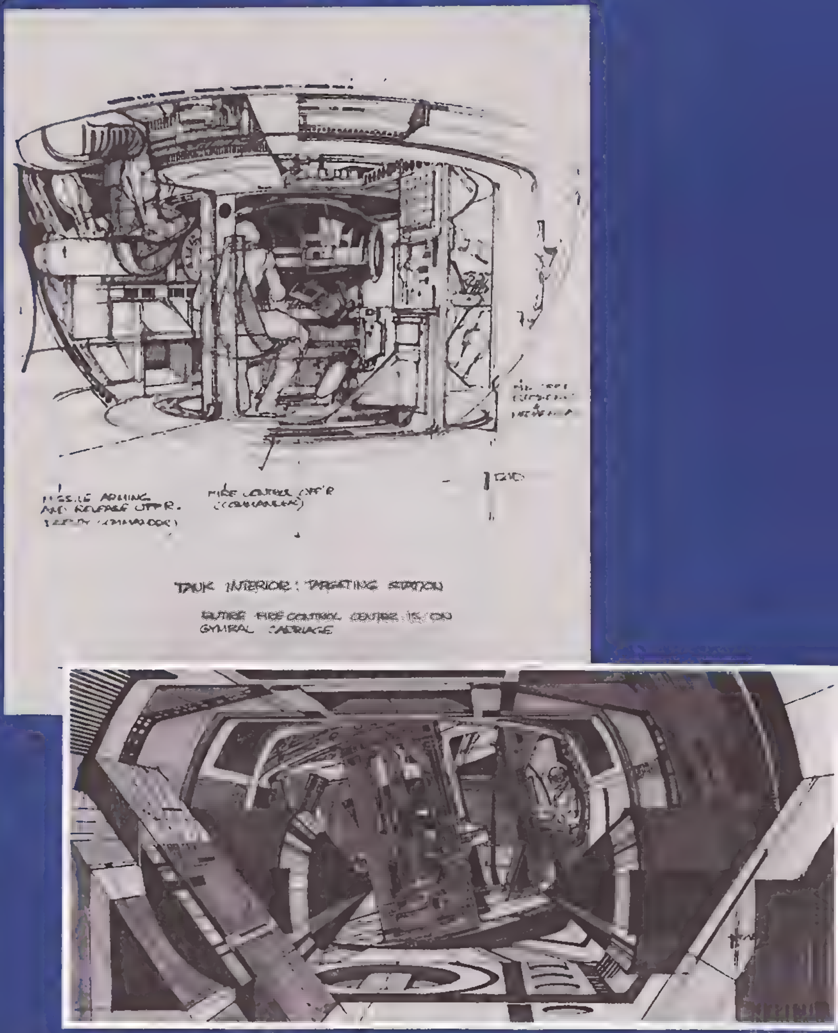
As the tanks chase the runaway cycles, a second tank accidentally bumps the first tank off a cliff, MAGI



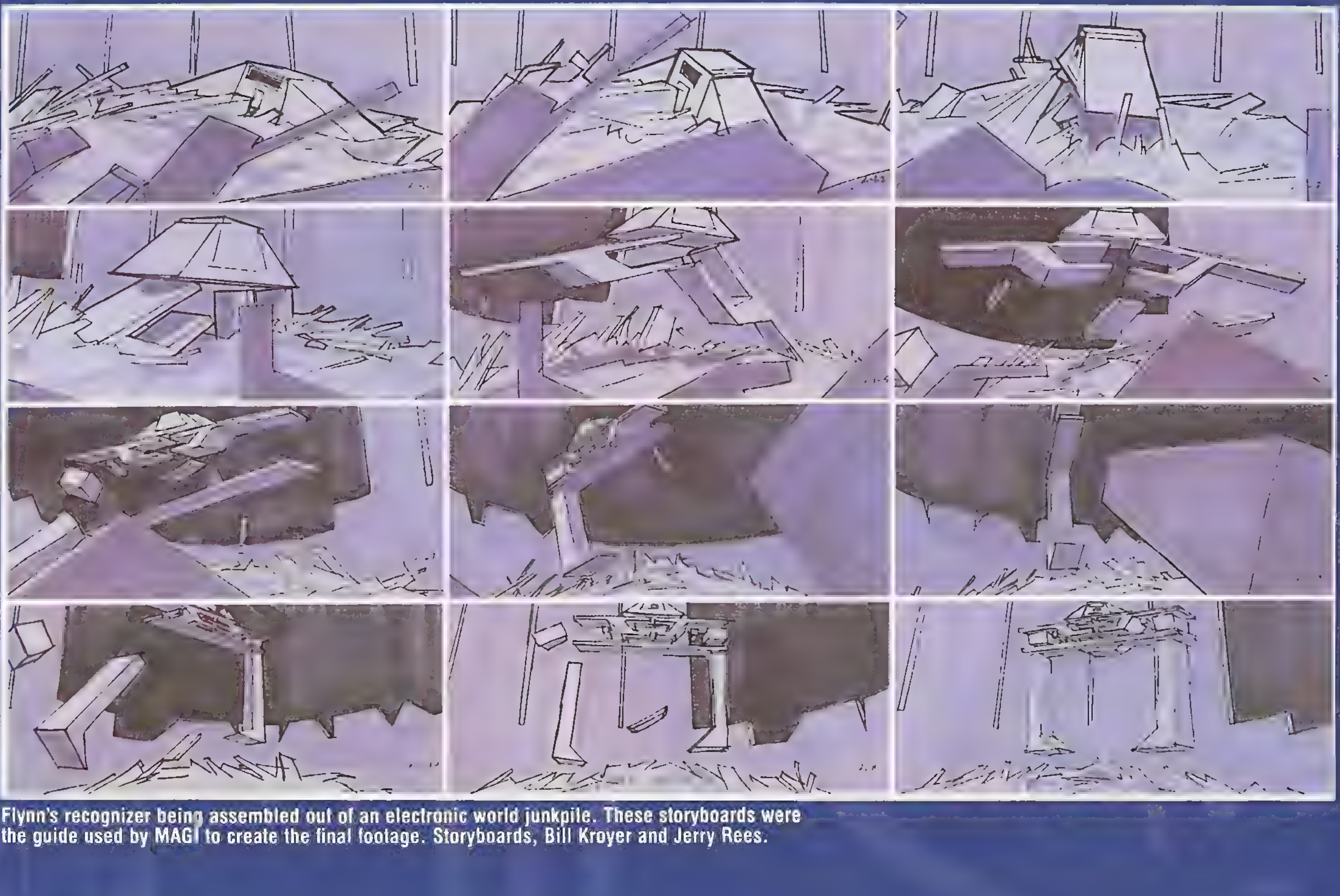
Finished tank, MAGI


TANK : 'ARMAMENT'.
OBLATE CURVES INTERSECTING WITH ACUTE ANGLES: EXAGERATED PROPORTIONS of 'GUN' TO VEHICLE.

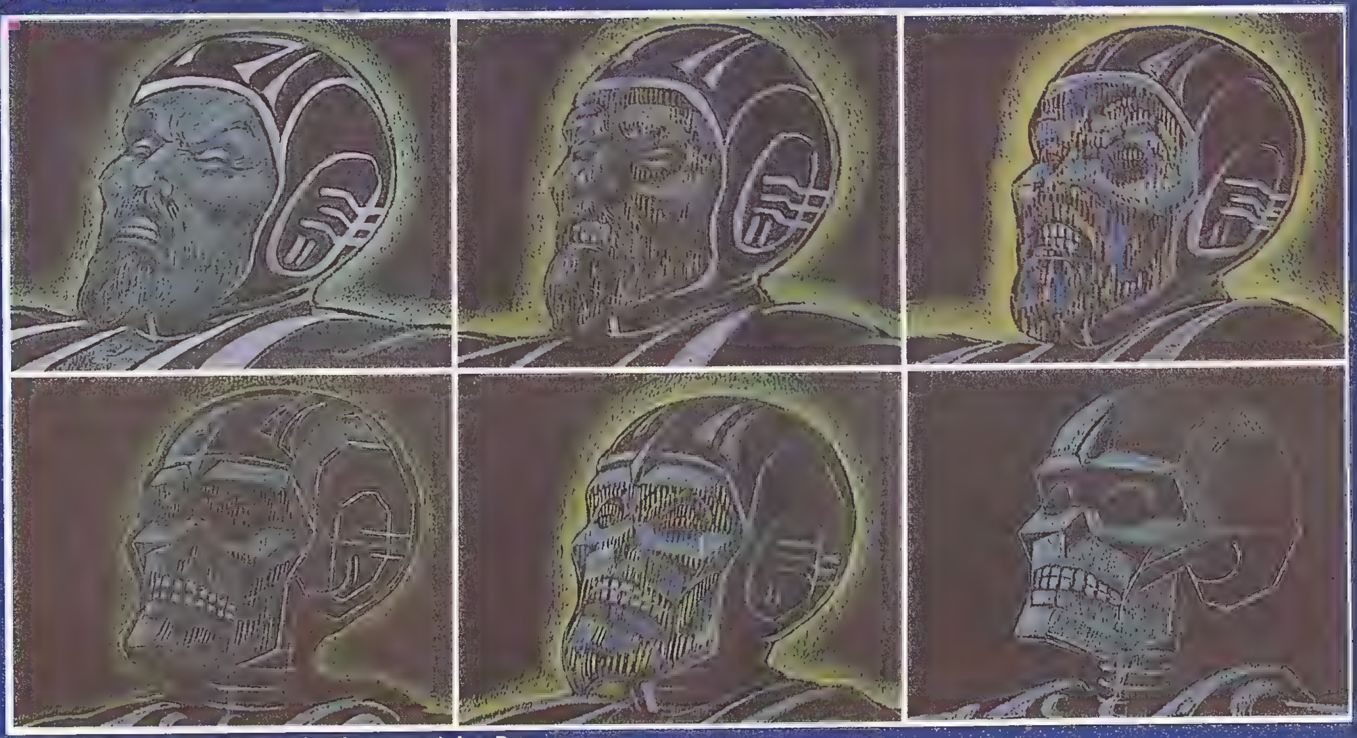
Exterior electronic tank, Syd Mead


MISSILE ARMING AND RELEASE OFFR.
FIRE CONTROL OFF'R (COMMANDER)
TANK INTERIOR: TARGETING STATION
ENTIRE FIRE CONTROL CENTRE IS ON GYMBAL CARRIAGE

Interior electronic tank, Syd Mead



Flynn's recognizer being assembled out of an electronic world junkpile. These storyboards were the guide used by MAGI to create the final footage. Storyboards, Bill Kroyer and Jerry Rees.



Dumont being tortured. Effects animation concept, Lee Dyer.

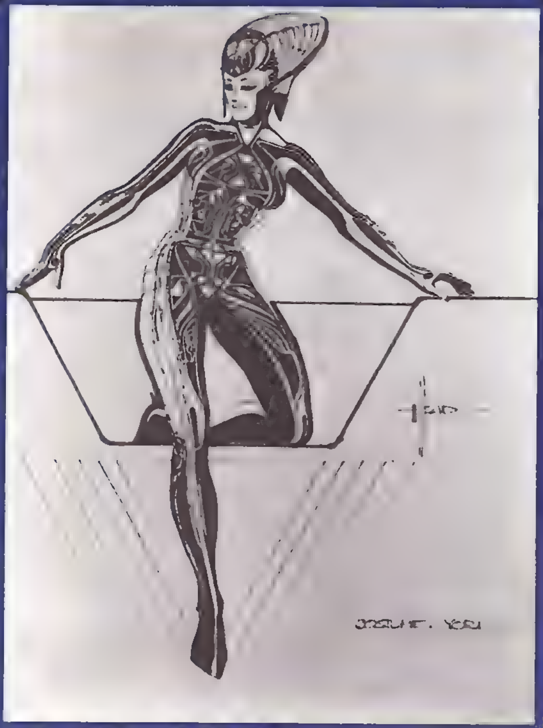
Effects animation concept, Lee Dyer

17. EFFECTS ANIMATION

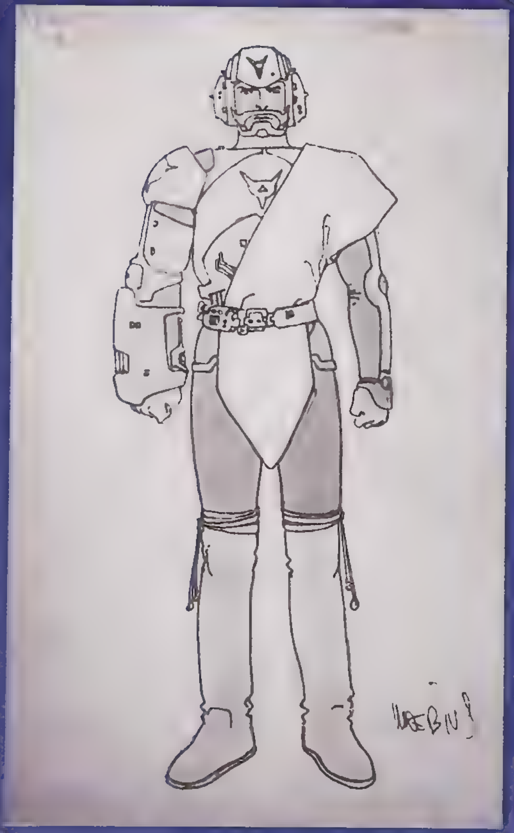
Lee Dyer was the supervisor of effects animation for the movie. The sparks and flashes of weaponry that made the fantasy truly electric were designed by Dyer and performed by a twenty-one-member staff, which included seven animators, eleven assistants, and three effects airbrushers. In the first two months of postproduction, Dyer charted and designed animation for every sequence in the film which needed a light effect drawn to enhance it. Some effects—like de-rezzing warriors, disk light, and ring game pellets—were present throughout the movie. Others, dubbed "isolated effects," were seen only once in the story. A total of seventeen minutes of effects animation appeared in the finished film.

"My main objective," related Dyer, who assembled the top-notch effects team, "was to stay away from familiar effects. The whole idea behind 'TRON' was to create something visually unique, and that certainly applied to the animation we did. We had a lot of obstacles to overcome, such as all the interactive light (the reflection from a light source, such as a disk) that had to be put on the characters, but we all worked together and I'm real happy with the way our work turned out."

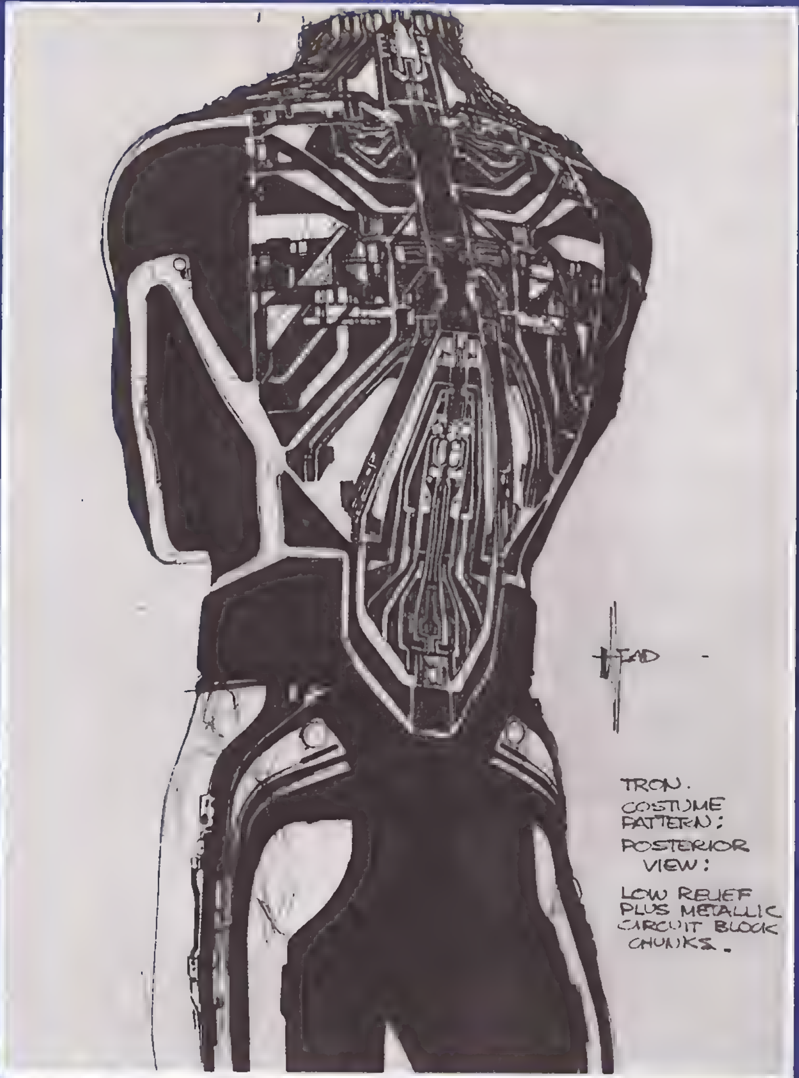
A native of Toledo, Ohio, Dyer started his career at age nineteen at Disney Productions. He worked on the studio's character animation staff for twelve years, from "101 Dalmations" through "Jungle Book." Then he left Disney to work as a free-lance commercial animator and at Hanna Barbara and Ralph Bakshi Studios.



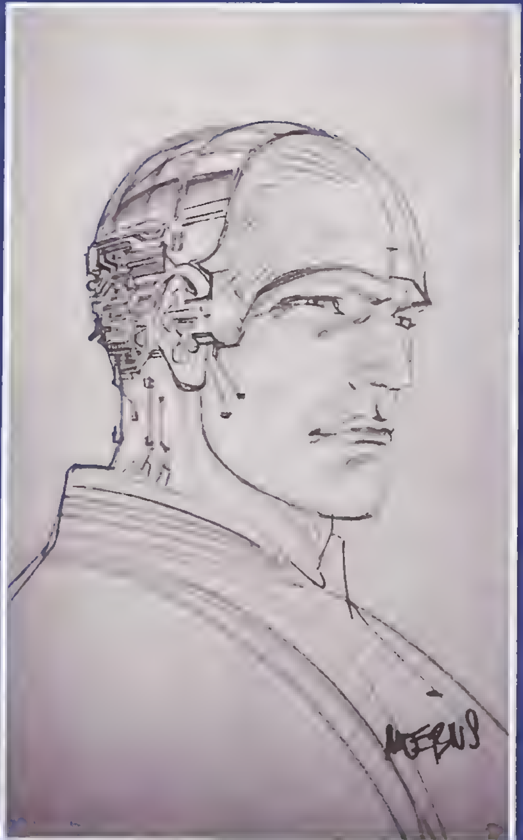
Yori costume concept, Syd Mead



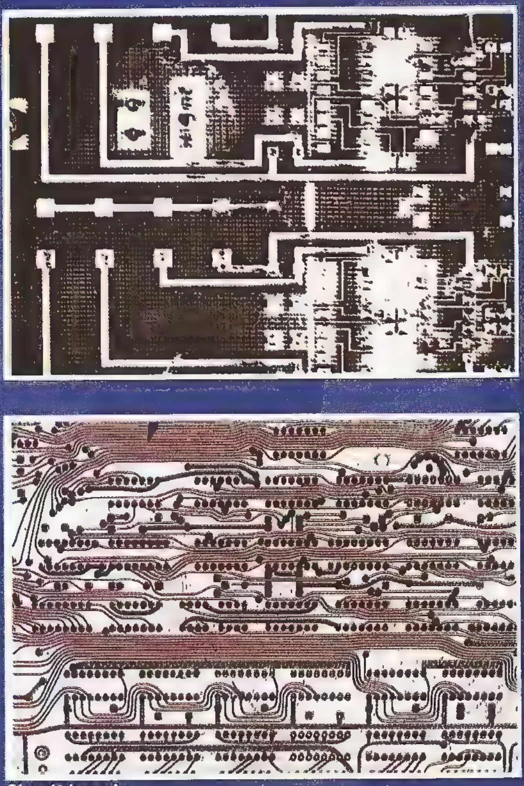
Flynn costume concept, Moebius


TRON.
COSTUME PATTERN;
POSTERIOR VIEW:
LOW RELIEF PLUS METALLIC CIRCUIT BLOCK CHUNKS.

Tron "circuit" pattern for costume, Syd Mead



Helmet design, Moebius



Circuit boards

Tron with backlight compositing for early advertising art

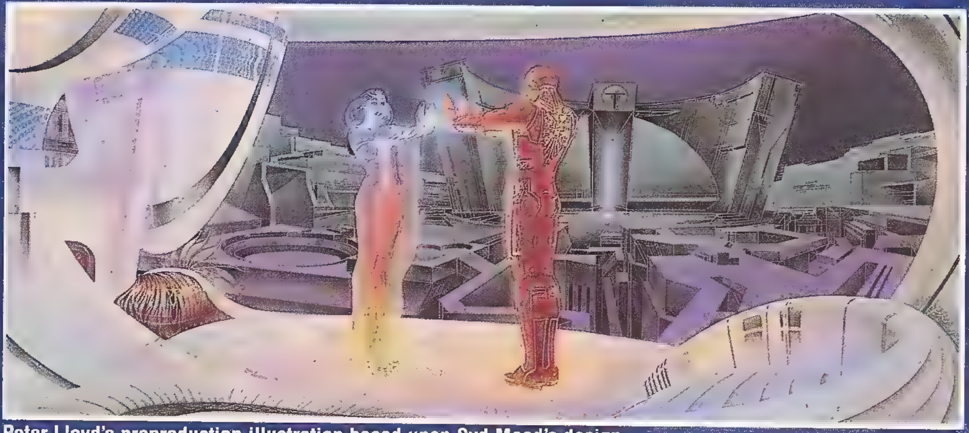
18. COSTUMES

The general design of the "TRON" costumes was set by the preproduction sketches drawn by Moebius. The costume design of the guards, Sark, Tron, Dumont, and Yori remained true to the artist's renderings, but some special problems went unsolved until late in the production.

Costumes worn by the actors were all made of white material imprinted with black circuitry patterns. In the months preceding the start of production, Lisberger examined hundreds of circuit styles, including many from his personal collection of circuitry designs. Syd Mead drew a back view of Tron which became the actual design on the back of his costume, but the patterns on the other costumes were in debate until the first day of production. Richard Taylor was still painting, gluing, and cutting to get the costumes ready for filming. Taylor was a major influence on the circuitry that was finally seen on the characters in the film. The outfits themselves were dance leotards supplemented with belts, boots, shin guards, ice hockey helmets, and elbow pads. The guards' padding and Sark's headgear were constructed from a Moebius design by Jack Sandeen's Disney costume department.

Many of the exotic costumes of characters in the electronic world were the work of costume designer Elois Jenssen. Ms. Jenssen's credits include such diverse projects as television's *I Love Lucy* series and "Close Encounters of the Third Kind." The Medusa Warrior and Brillo Man were two of her contributions to "TRON."

Yori costume concept, Moebius



Peter Lloyd's preproduction illustration based upon Syd Mead's design

Cindy Morgan as Lora, a computer programmer in the real world

Cindy Morgan as Yori in the electronic world

19. YORI

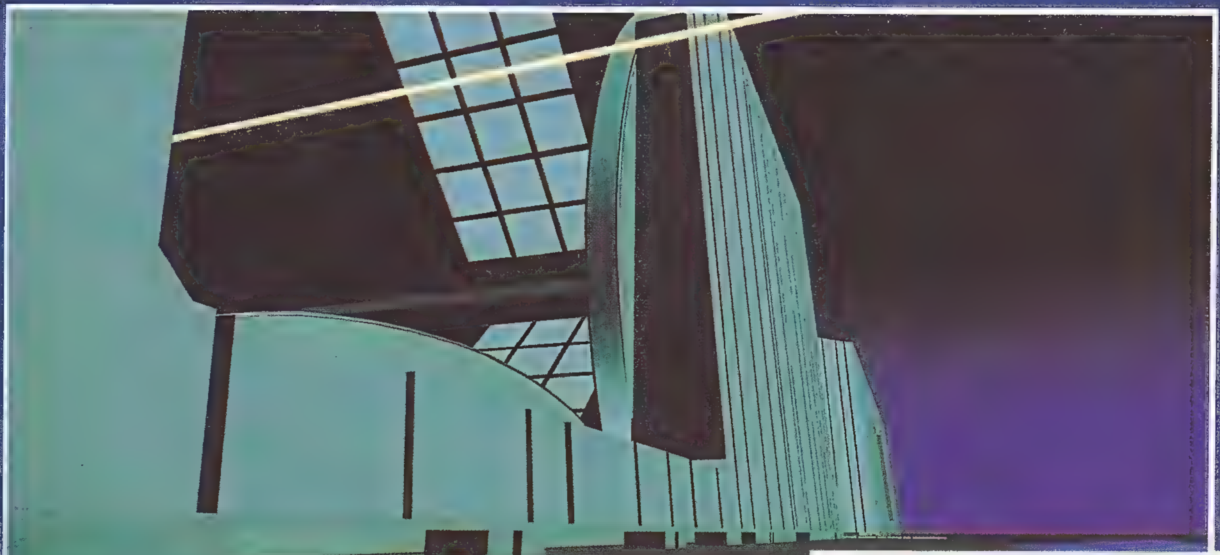
A five-foot-seven-inch blonde with delicate features and a modeling background, Cindy Morgan was born in Chicago and educated at Northern Illinois University in Dekalb, Illinois. She admitted frankly that she attended the school, "to find a husband." She didn't land a spouse. Instead, she discovered her ability to act, which landed her a career.

"I hadn't thought about acting until I took a speech class where we had to create extemporaneous speeches. I found that I could get the entire class with me, make them laugh, get them involved. After that, it was always in the back of my mind to try acting as a profession," she said.

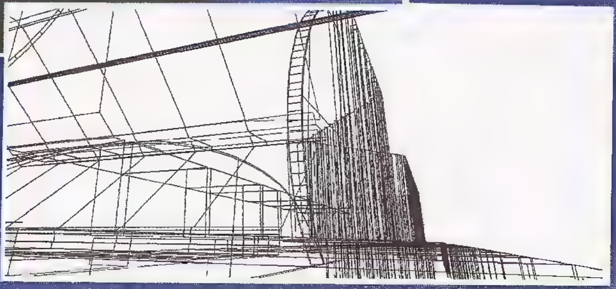
Before arriving in Los Angeles in 1978, Morgan worked as a television meteorologist at stations in northern Illinois and as a disc jockey on an all-female FM station in Chicago. This was followed by modeling assignments, one of which took her to Los Angeles where she decided to stay. She was soon getting work in television commercials. In 1980, she won the female lead in the hit film "Caddyshack" opposite Chevy Chase and Bill Murray. She has appeared in a number of television series including the pilot for *Bring 'Em Back Alive* with her "TRON" co-star Bruce Boxleitner.

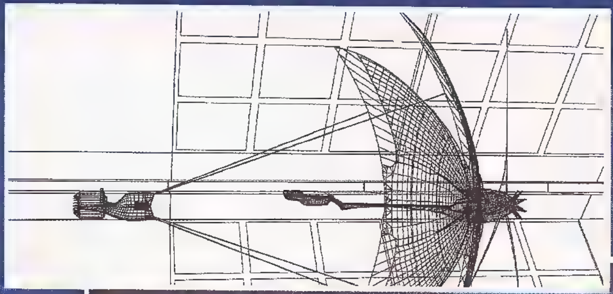
20. SOLAR SAILER

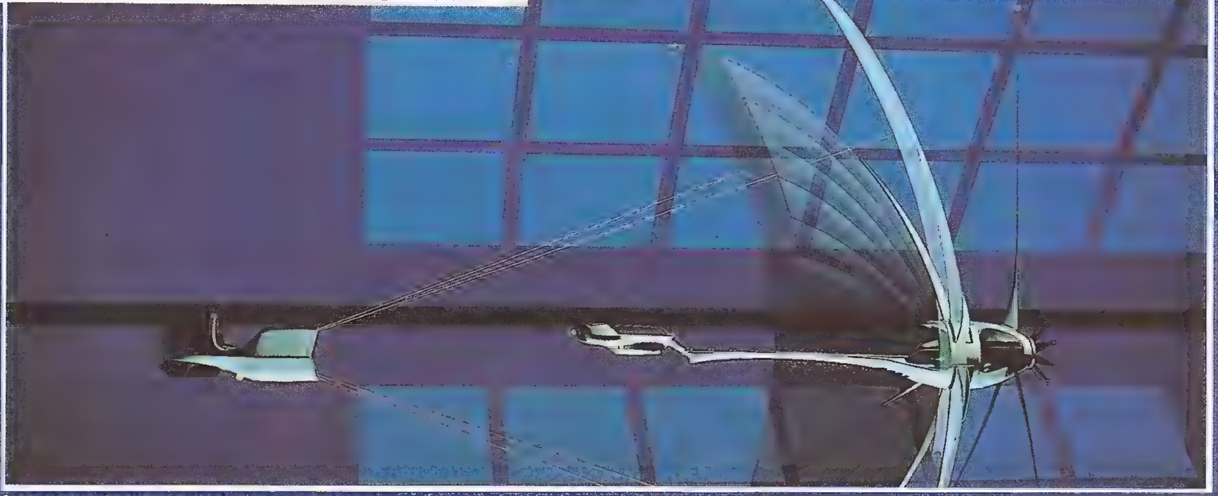
Syd Mead's initial inspiration for the Solar Sailer was to give it a horizontal mast, a sail like a huge parachute, and a hull like a Spanish galleon. Mead's design was transfigured by the pen of Moebius to one which retained the original form but added a high-tech hull and a "receptor," which allowed it to ride an energy beam through the atmosphere. The Solar Sailer was then computer-generated at Information International through Larry Malone's interpretation of Moebius's sketches.



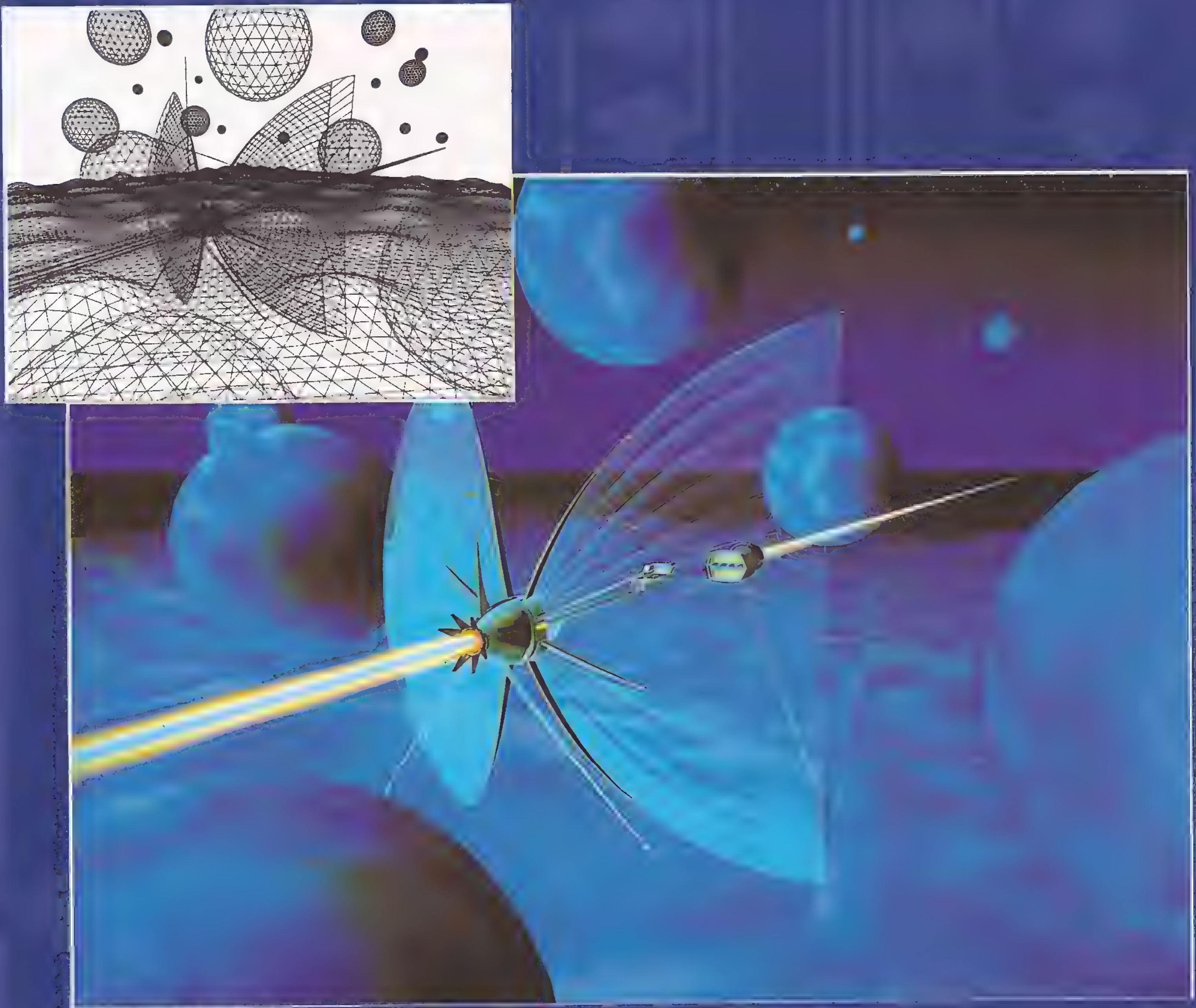
Exterior view of solar sailer in hangar, Triple-I



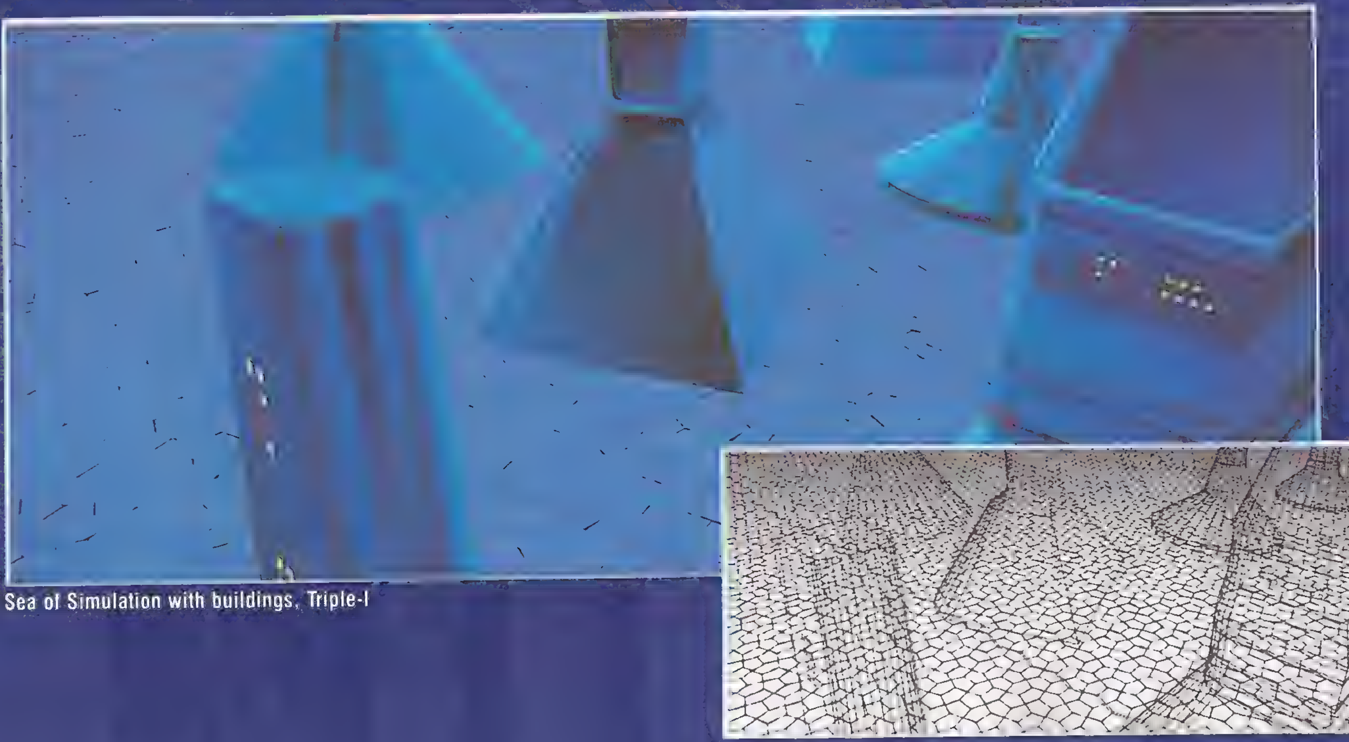




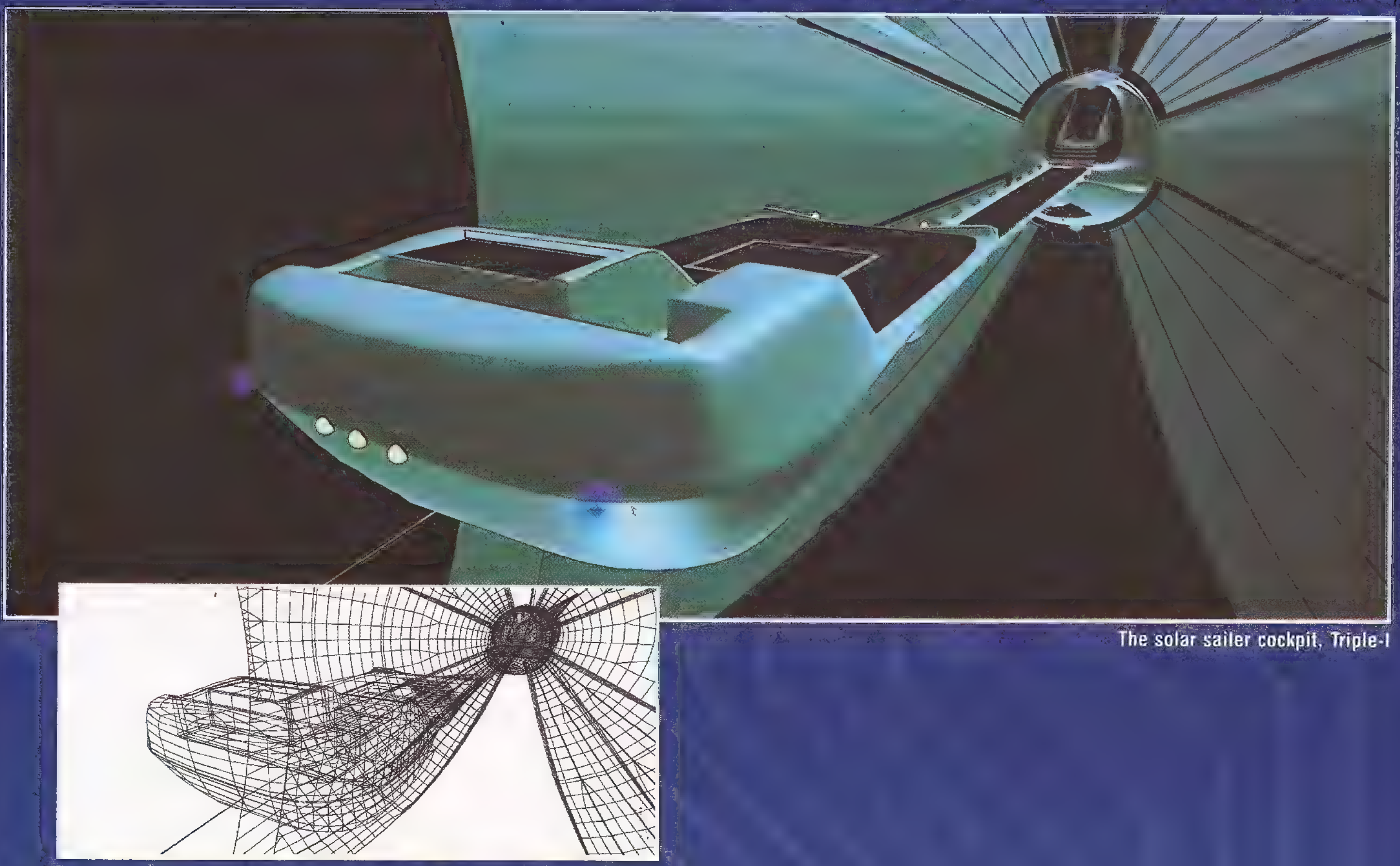
Side view of solar sailer in hangar, Triple-I



The solar sailer in the Sea of Simulation, Triple-I

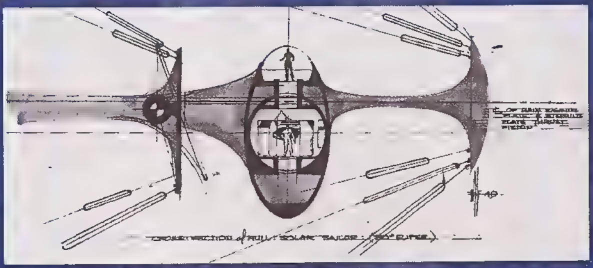


Sea of Simulation with buildings, Triple-I

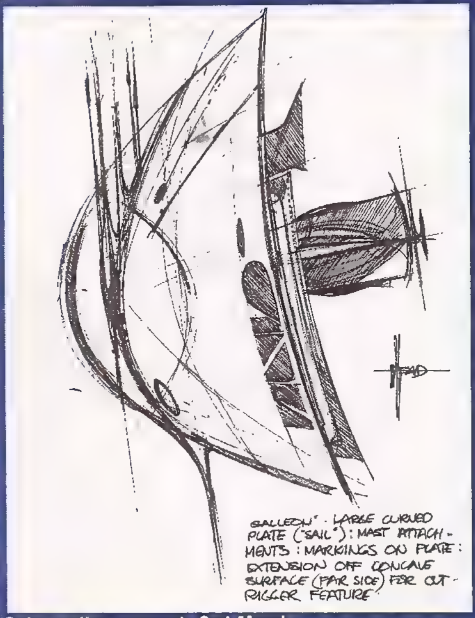


The solar sailer cockpit, Triple-I

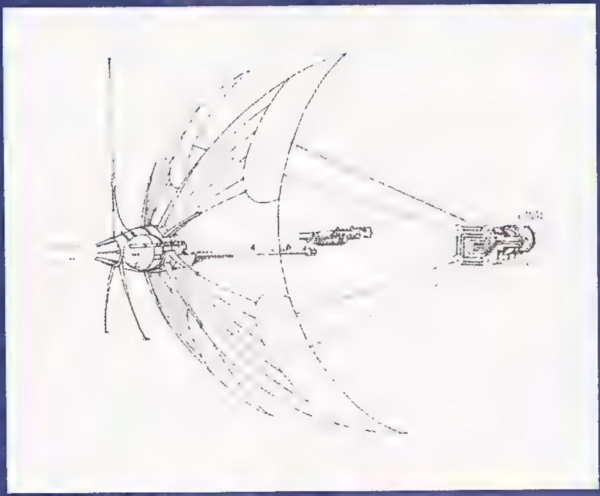
Solar sailer about to be rammed by Sark's carrier, Triple-I



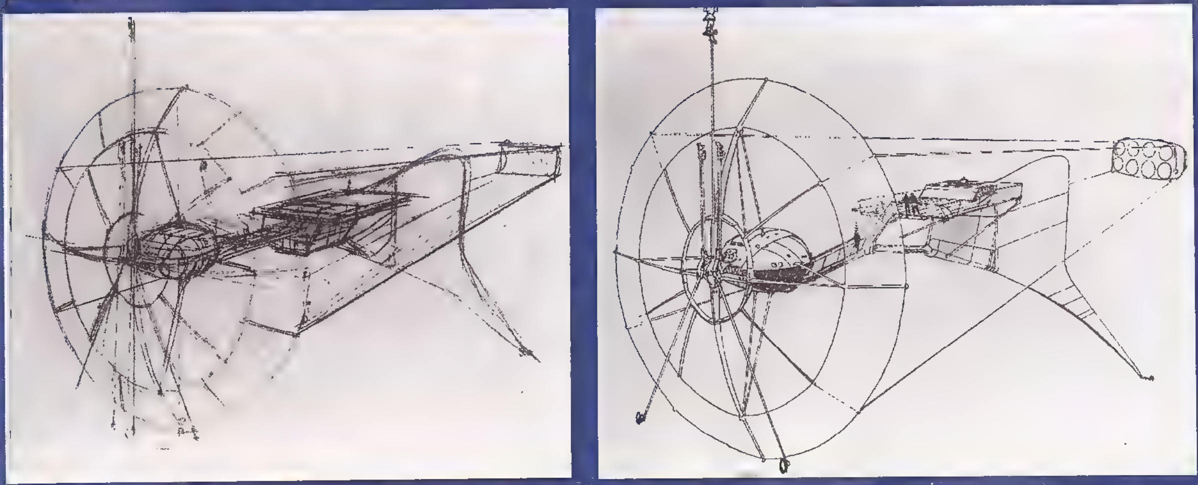
Cross-section hull solar sailer, Syd Mead


MEAD
"GALLEON" · LARGE CURVED PLATE ("SAIL"): MAST ATTACHMENTS: MARKINGS ON PLATE: EXTENSION OFF CONCAVE SURFACE (FAR SIDE) FOR OUT-RIGGER FEATURE"

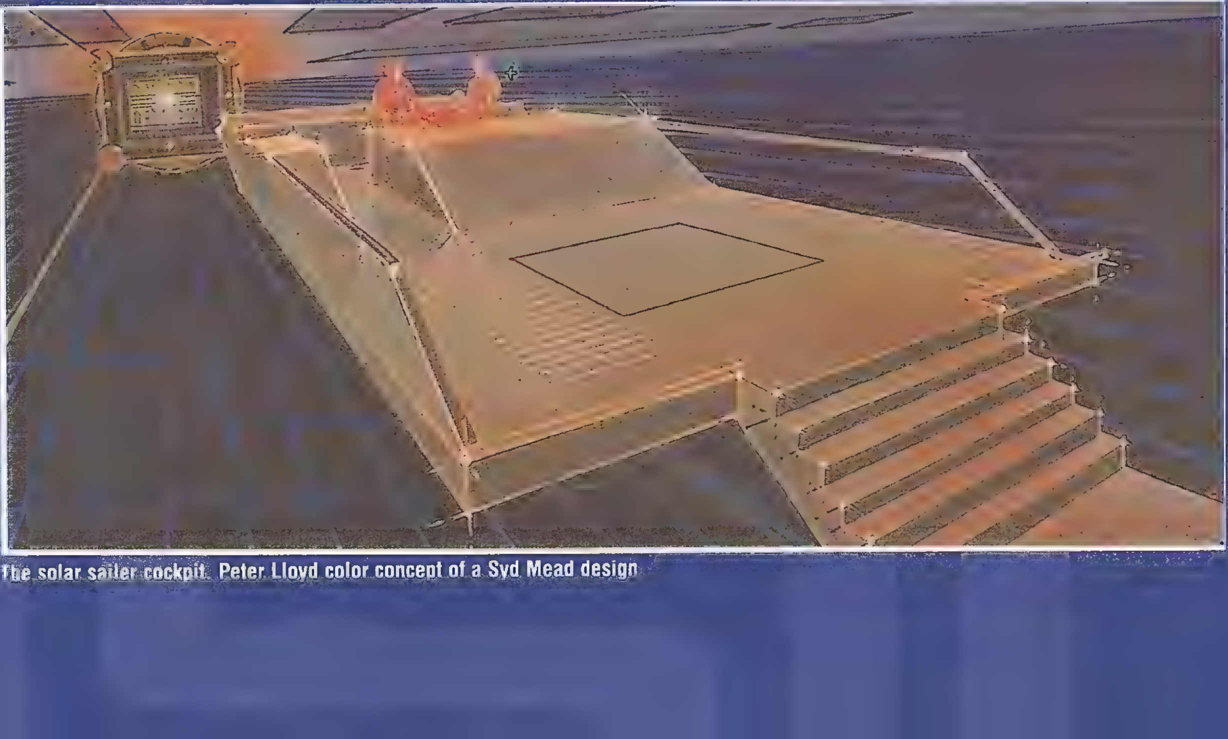
Solar sailer concept, Syd Mead



Final solar sailer design, Moebius

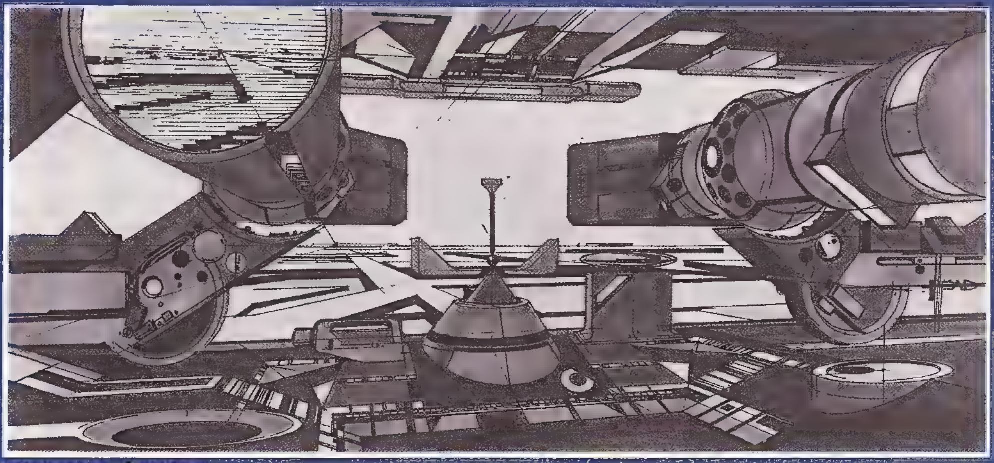


Solar sailer concept, Moebius



The solar sailer cockpit. Peter Lloyd color concept of a Syd Mead design

Flynn's reco out of control



Interior reco, Syd Mead

Two recos attacking

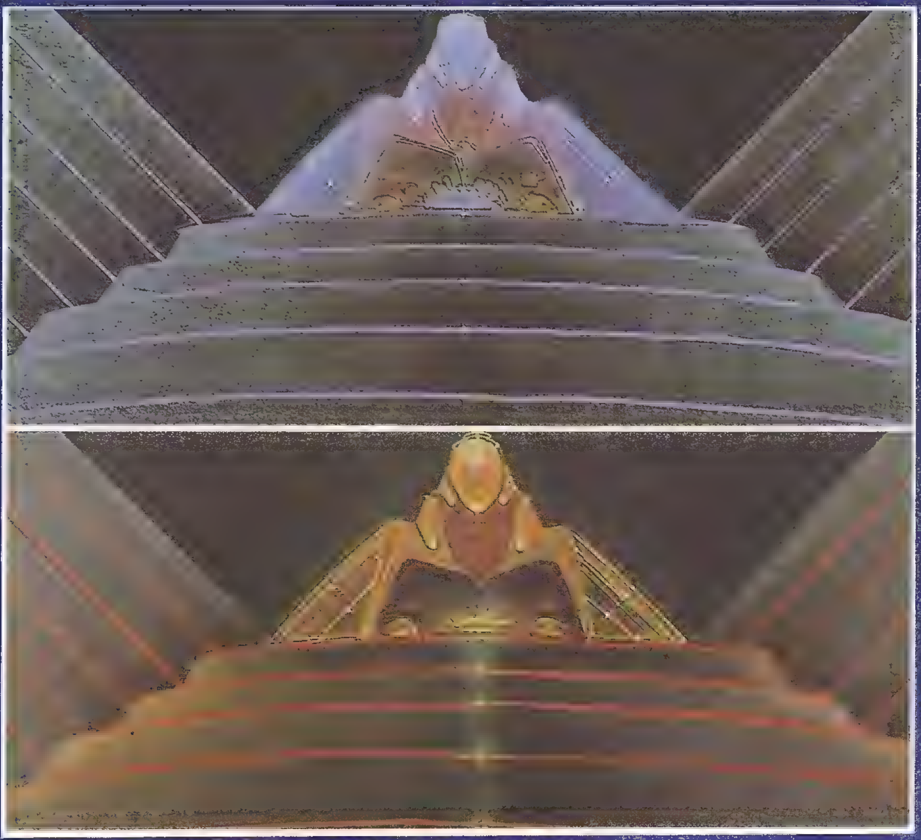
21. RECOGNIZERS

The name for the Recognizers was taken from a computer term for a function that can identify a program and "route" it into the proper routine. In "TRON," the Recognizers, or Recos, were the immense police robots, which constantly patrolled for programs out of the proper sector.

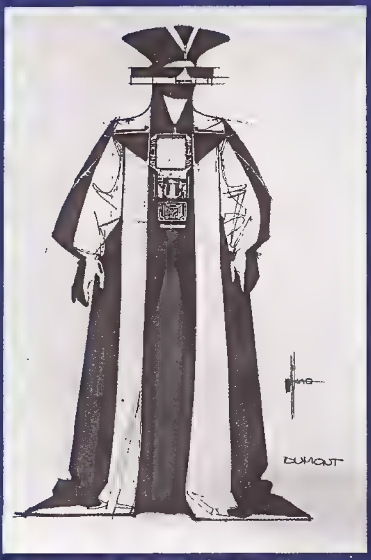
The Recognizers were one of the few elements of the picture that remained virtually unchanged from their initial design. John Norton, who was part of Steven Lisberger's original Boston group that emigrated to California, created a style sheet for the robots. Unique-looking and easy to build by computer, there was never a need for revising Norton's concept.

MAGI generated all the Recognizer exteriors in the film. The interiors were designed by Syd Mead to resemble the design of the tank interiors. The inspiration for the vehicle interiors was the computer price code found on consumer goods.

"We came up with the idea of using the coded lines as a design because Steven felt it was something audiences would find familiar, at least in their subconscious," noted Mead. "We were always looking for ways to make this totally alien world inside the computer more understandable to audiences."



Dumont color concepts, Peter Lloyd, based on a design by Moebius



Early Dumont concept, Syd Mead

Dumont, Moebius

22. DUMONT

Of all the cast members of "TRON," Barnard Hughes was the least familiar with the territory.

"I don't know about computers," he said. "I remember when I was young and my family got its first radio, how excited I was. Somehow I can't work up the same enthusiasm for computers. History has always given people the benefit of the doubt—we tend to remember the good and forget the bad. Now computers are never going to let us forget anything."

For all his professed discomfort with the subject matter of the movie, Hughes took pains to make certain his role as Gibbs/Dumont was portrayed in a legitimate way. He spent time with the computer programmers at Information International and found that they approached their machines with an almost mystical attitude, an attitude he tried to bring to his role. Hughes also studied the storyboards carefully by which Steven Lisberger mapped out the action for the film.

"When you're out there with no backgrounds, no props, the storyboards are a great help in showing what the finished scene will look like," the veteran actor said.

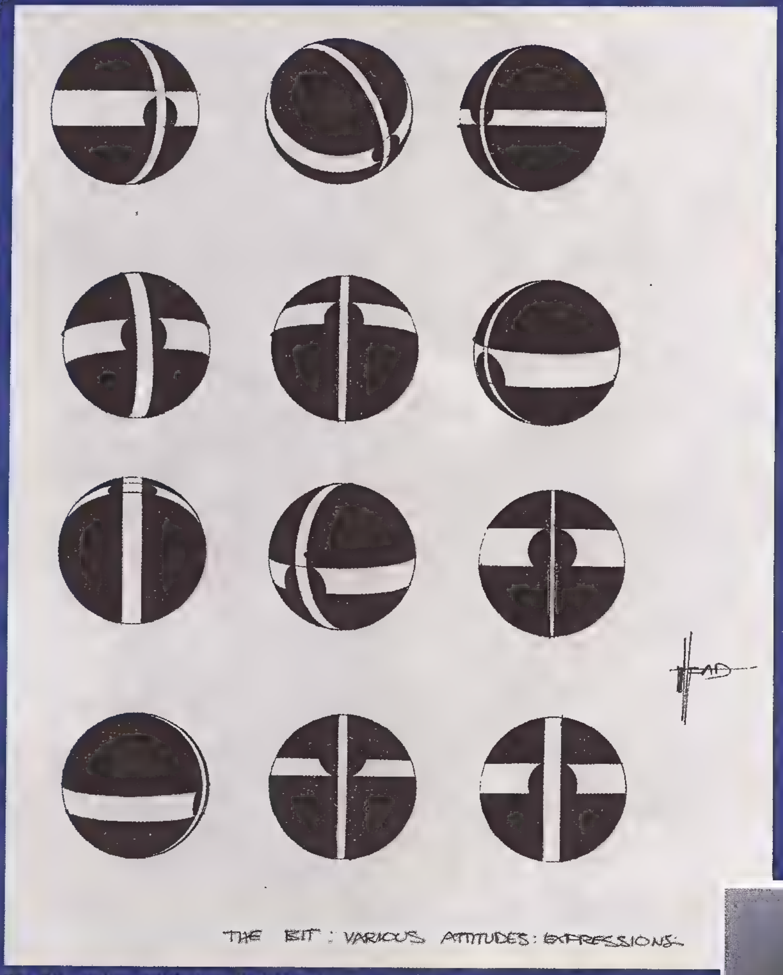
Hughes is among the most versatile actors in show business. His stage career began in 1934 and has since spanned touring repertory companies, regional theater, and Broadway. He has starred in such Broadway productions as *How Now Dow Jones*, *Uncle Vanya*, *The Good Doctor*, and *Da*, for which he won a Tony as best actor in 1979.

On television, he has starred in *Look Homeward, Angel*, *The Bob Newhart Show*, *All in the Family*, and has won an Emmy for a guest performance on *Lou Grant*. His motion picture career includes roles in "The Hospital," "Midnight Cowboy," "Oh, God!" and "First Monday in October."

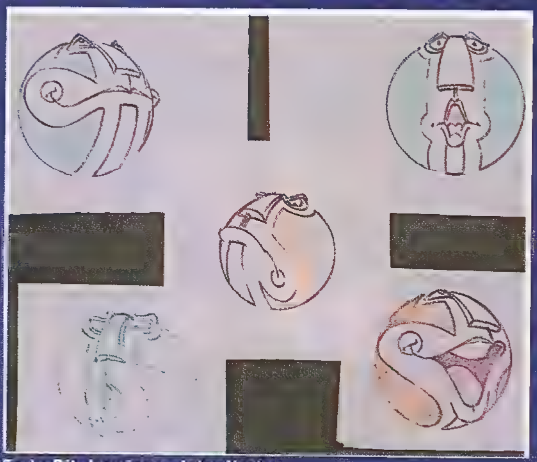
23. THE BIT

Based on the notion that a computer "bit" is a pulse that registers either "on" or "off" in the computer's memory, Flynn's hovering companion peppered him with affirmative or negative messages, depending on their situation. The Bit evolved through many design changes, both before and after "TRON" was brought to Disney. John Norton designed the final version—a geometrical character that was computer-simulated by Digital Effects Inc.

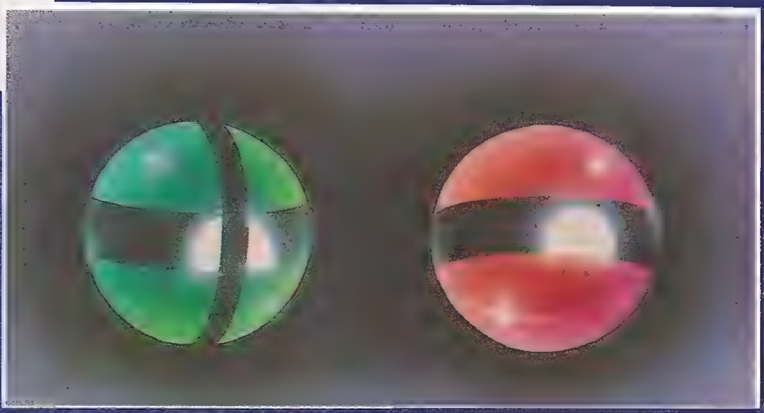
Judson Rosebush of Digital Effects devised the graphics program that sent the Bit into its "yes" or "no" mode. "Basically," said Rosebush, "the Bit is two intersecting polyhedra which constantly move and oscillate when it's in its neutral stage. For 'yes' or 'no' it very briefly becomes a single, nonoscillating polyhedron. [Scene coordinator] Deena Burkett or John Norton told us where to put the thing in each frame, and we put it there and made it wiggle."


THE BIT : VARIOUS ATTITUDES : EXPRESSIONS

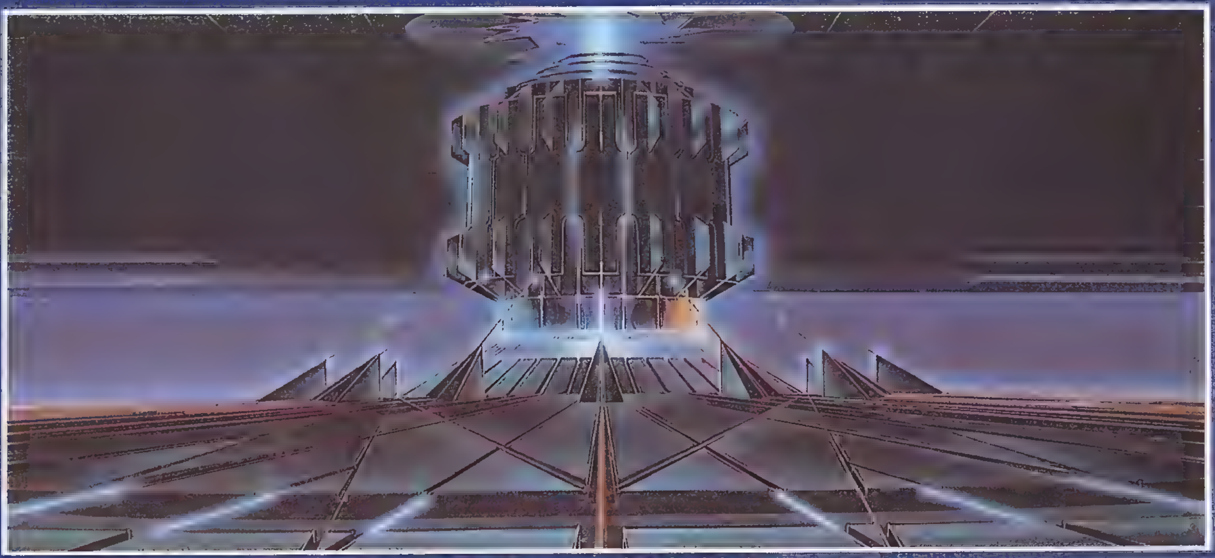
The Bit, various attitudes, Syd Mead



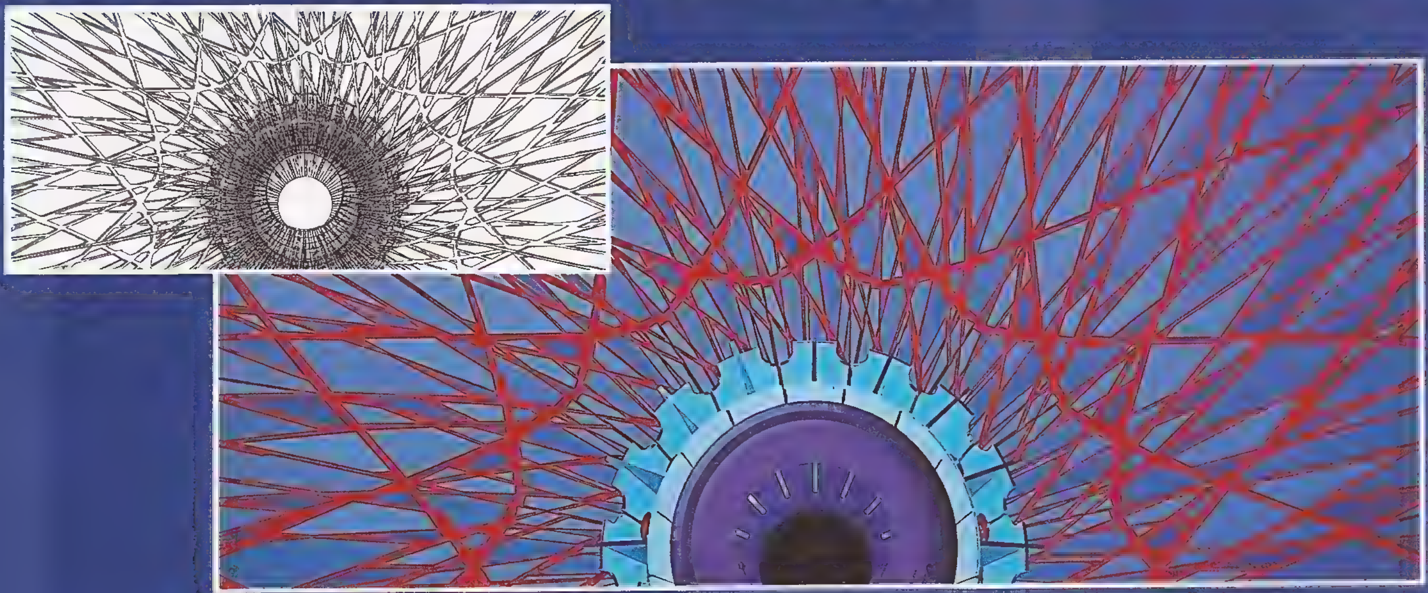
Early Bit drawings, John Norton



The Bit as a plus (green) and minus (red)
by Peter Lloyd from a Syd Mead design

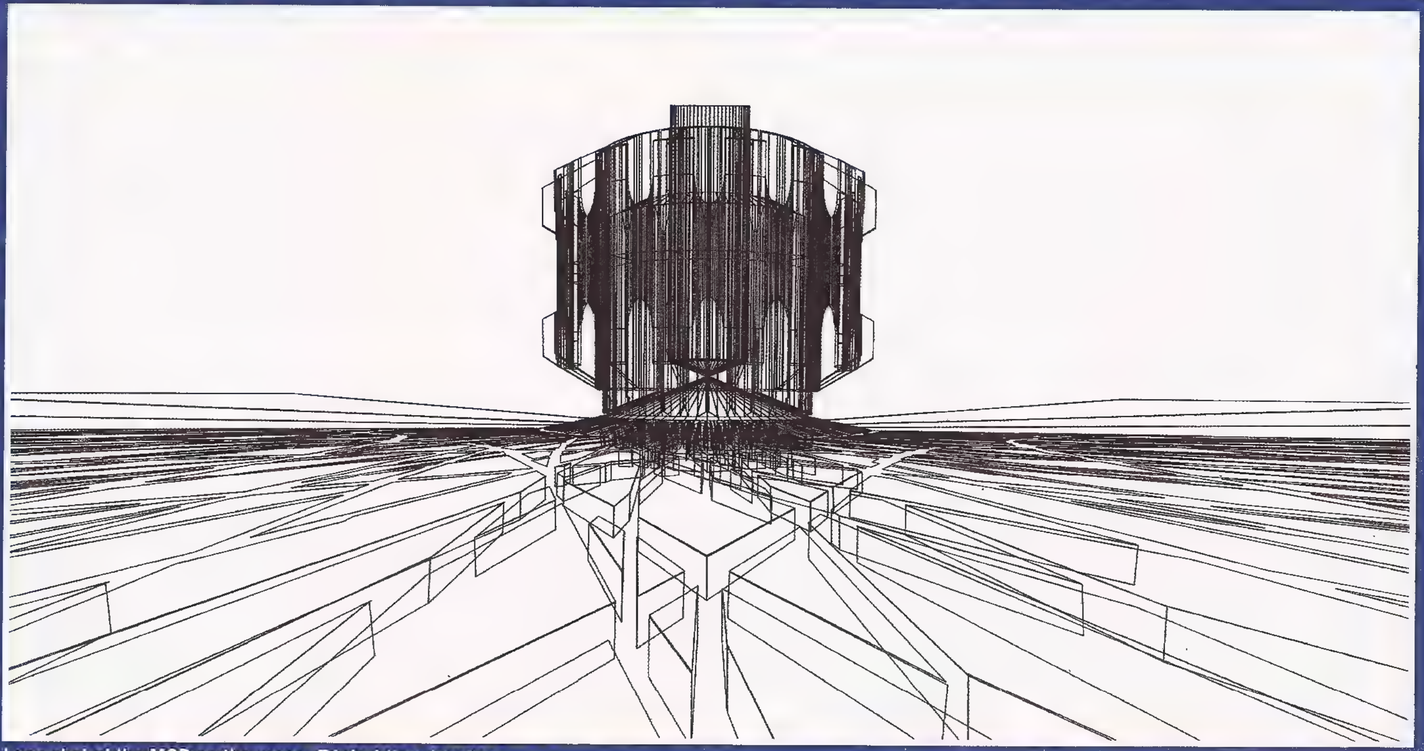


Exterior MCP. A preproduction illustration by Peter Lloyd based on a Syd Mead design

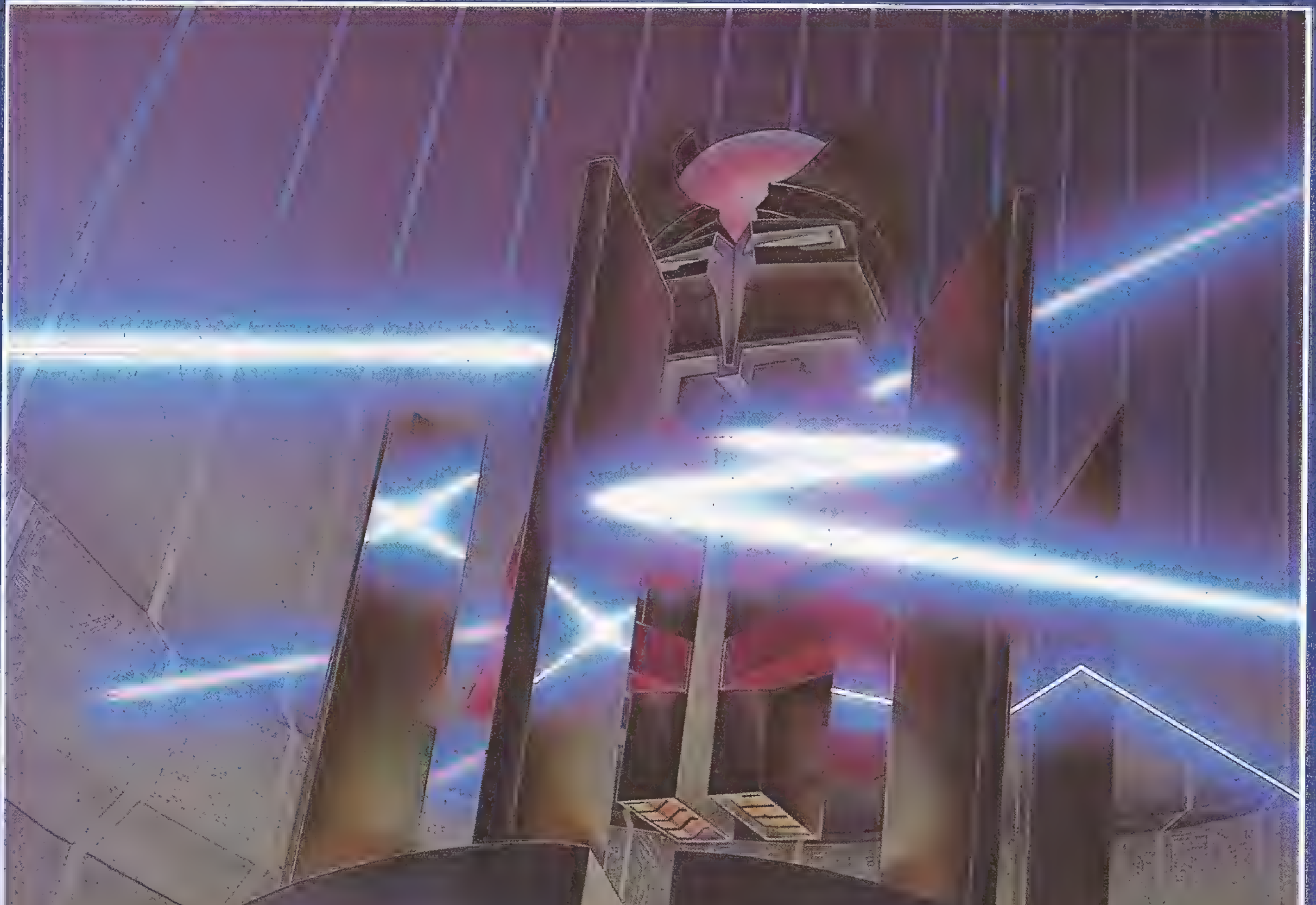


Down view of the MCP on the mesa. Triple-I

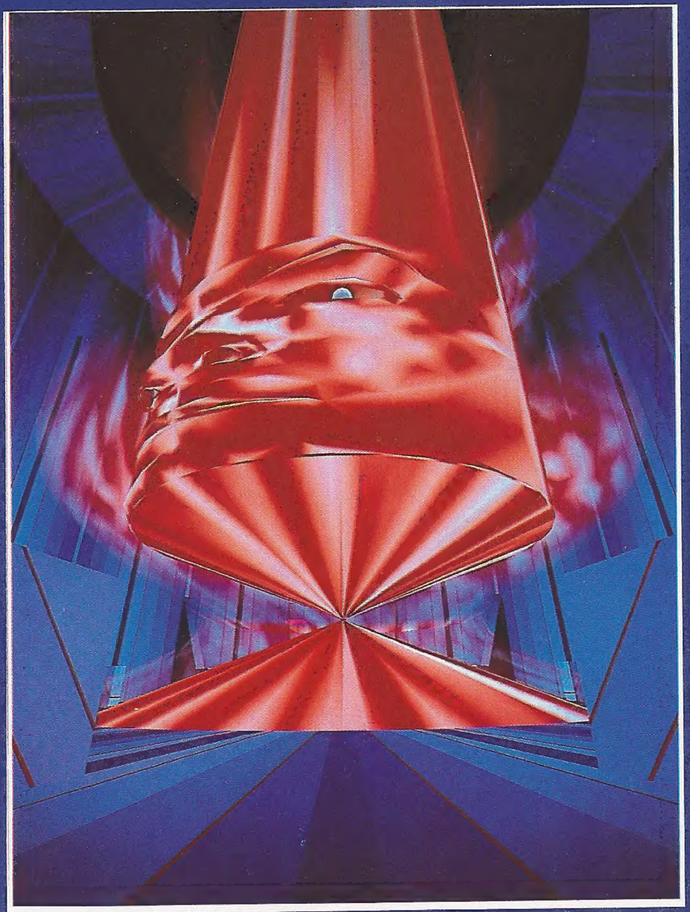
The MCP (Master Control Program) exterior. Triple-I



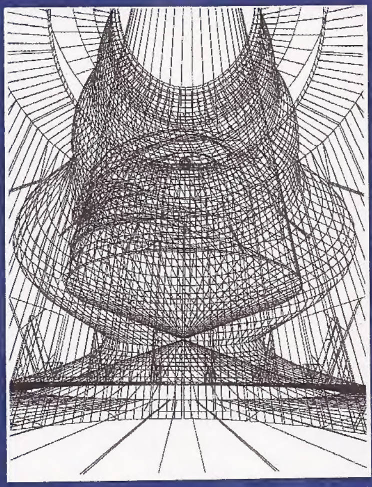
Long shot of the MCP on the mesa. Triple-I line drawing



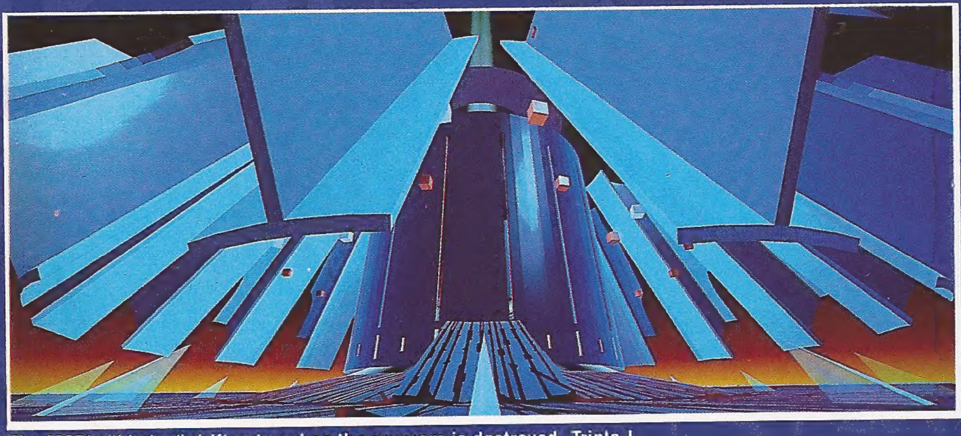
Early MCP design. A drawing by Roger Allers, painted by Peter Mueller



Interior of the MCP: the heart of the evil Master Control Program. The designs for the MCP were created by Syd Mead. Triple-I's computer programmers used these designs as a basis to compute the images for the all-powerful villain.



Dumont (center) and other captured programs under guard



The MCP's "blades" drift outward as the program is destroyed, Triple-I

24. THE MASTER CONTROL PROGRAM

"Steven was intrigued by a story I told him about a young inventor who had found that by programming the on/off configuration of the points of light on a rotating cylinder, a three-dimensional image could be generated. This fellow sold the idea to the people who make the Cat-Scan equipment for hospitals. They use it to 'see' the body's internal organs in three dimensions. We decided to use the same notion of a rotating cylinder in creating the MCP," said Syd Mead, describing the origins of the Master Control Program design.

Based on Mead's drawings, the artists at Triple-I built the MCP tower and its interior cylinder. The mesa on which Tron and Sark fight the climactic disk battle was also created at Triple-I from a design by Peter Lloyd.

25. LINGO

No book on the art of "TRON" would be complete without mention of some of the terms that the artists used in their daily work. The language was an art in itself. The outsider who dropped in on a staff meeting had a hard time figuring out what was being said. The following is an abridged glossary for those who might wish to someday communicate with a "TRON" artist.

CEL FLOPPER—A scene in which animation is done by moving art through the frame on a series of cels (acetate transparencies).

GEL DOGGY—Nickname for assistant scene coordinator, whose responsibilities included cataloguing color camera gels.

GO TO GLOW—A description of a shot when a character is supposed to suddenly heat up and glow brightly.

HERO—A good shot. A scene ready to be cut into the film.

LOW REZZ/HIGH REZZ—Terms referring to high resolution or low resolution computer graphics images.

PHONE FIX—Telephone the cameraman for a correction in a shot.

RDIP—Redo a shot if possible.

SCHEELE FIX—A shot given to technical effects supervisor John Scheele for a quick fix-up. What to do with a Stage Two Pop.

STAGE TWO POP—An unintentional shift in the intensity of a character's circuits.

WEDGING—The exposure and color testing done before a scene is sent to camera.

Directed by
STEVEN LISBERGER

Screenplay by
STEVEN LISBERGER

Story by
STEVEN LISBERGER
and BONNIE MacBIRD

Produced by
DONALD KUSHNER

Executive Producer
RON MILLER

Associate Producer
HARRISON ELLENSHAW

A LISBERGER/KUSHNER PRODUCTION

Director of Photography
BRUCE LOGAN

Production Designer
DEAN EDWARD MITZNER

Film Editor
JEFF GOURSON

Starring
JEFF BRIDGES

BRUCE BOXLEITNER

DAVID WARNER

CINDY MORGAN

and
BARNARD HUGHES

Co-starring
DAN SHOR

PETER JURASIK

TONY STEPHANO

Music by
WENDY CARLOS

Conceptual Artists
(Electronic World)

SYD MEAD
JEAN "MOEBIUS" GIRAUD
PETER LLOYD

Music and Sound Design
Supervisor
MICHAEL FREMER

Music Performed by
LOS ANGELES ORCHESTRA
Conducted by
RICHARD BOWDEN

THE LONDON PHILHARMONIC ORCHESTRA
Conducted by
DOUGLAS GAMLEY

Orchestrations by
JORGE CALANDRELLI

Unit Production Manager
RALPH SARIEGO

First Assistant Director
LORIN B. SALOB

Second Assistant Director
LISA MARMON

Costumes designed by
Elois Jenssen
Rosanna Norton

"Only Solutions"
"1990's Theme"
Written and Performed by
Journey

Sound Effects Design and Synthesis	FRANK SERAFINE, Seraline FX Studios
Music Synthesizer Performances and Processing	WENDY CARLOS
Sound Department Supervisor	BOB HATHAWAY
Supervising Sound Editor	GORDON ECKER, JR. (wallaWorks)
Sound Effects Editors	ANTHONY MILCH
	RANDY KELLEY
	MARVIN WALOWITZ
	VINCE MELANDRI
Production Sound Mixer	JIM LARUE
Scoring Recordist	JOHN MOSELY, C.A.S.
Re-Recording Mixers	MICHAEL MINKLER, C.A.S.
	BOB MINKLER, C.A.S.
	LEE MINKLER, C.A.S.
"MCP" Voice Processing	CHAMP DAVENPORT (Synthefex)
	JACK MANNING
Assistant to the Composer	ANNEMARIE FRANKLIN
Post Production Facilities	LIONS GATE SOUND
Executive in Charge of Production	THOMAS L. WILHITE
Studio Production Manager	TED SCHILZ
Art Directors	JOHN MANSBRIDGE and
	AL ROELOFS
Set Decorator	ROGER SHOOK
Script Supervisor	EDLE BAKKE
Casting	PAM POLIFRONI
Electronic Conceptual Design	JEAN "MOEBIUS" GIRAUD
	RICHARD TAYLOR
Costume Supervisor	JACK SANDEEN
Men's Costumes	LORRY RICHTER
Women's Costumes	NEDRA ROSEMOND-WATT
Make-up Supervisor	ROBERT J. SCHIFFER, C.M.A.A.
Make-up	GARY LIDDIARD
Hair Stylist	JOY ZAPATA
Mechanical Special Effects	R. J. SPETTER
Production Storyboards	BILL KROYER
	JERRY W. REES
	JOHN NORTON
	ANDY GASKILL
Pre-Production Concepts	JOHN NORTON
	ROGER ALLERS
	CHRIS LANE
	PETER MUELLER
Assistant Editors	WALTER HEKKING
	BAYLIS GLASCOCK
Negative Cutting	ED CAPUANO
Dialogue Editing	STAN GILBERT, M.P.S.E.
	ROBERT BRADSHAW
	BILL SHENBERG
Foley Editor	MIKE WILHOIT
Music Layout	JEFFREY GUSSMAN
Special Record Coordination	MICHAEL DILBECK
Assistant Sound Editors	BOB NEWLAN
	JOHN M. LOWRY
Camera Operators	RON VARGAS
	GREG HESCHONG
	REXFORD METZ
1st Assistant Camera Operators	HORACE JORDAN
	MIKE WELDON
	LYNN TOMES
	JAMES ANDERSON
2nd Assistant Camera Operator	MARIO ZAVALA
Draftsmen	BOB STAHLER
	BOB BEALL
	JOHN DAIL
	EUGENE HARRIS
	ANTOINETTE GORDON
Propmaster	WILBUR RUSSELL
Production Painter	SHELLEY PHILLIPS
Grip Supervisor	OWEN CROMPTON
Key Grip	STAN REED
Second Grip	RON PEEBLES
Electrician Supervisor	HERBERT HUGHES
Gaffer	ROGER REDEL
Best Boy	BERNIE BAYLESS

Visual Effects Concepts by
STEVEN LISBERGER

Visual Effects Supervised by
RICHARD TAYLOR
HARRISON ELLENSHAW

Effects Technical Supervisor
JOHN SCHEELE

Scene Coordinators	DEENA BURKETT
	MICHAEL GIBSON
	JOHN GROWER
	PETER BLINN
	DON BUTTON
	CLINT COLVER
	LINDA D. STOKES
	CRAIG NEWMAN
	JIM KEATING
	KERRY COLONNA
Assistant Scene Coordinators	JACQUI HOOKS
	CYNTHIA RUSH
	LAURA LEIBEN
	LYNDA ELLENSHAW
	SCOTT RUSSO
	JAMES VALENTINE
	DANA DUFF
	RON RAE
	SHELLEY HINTON
	PAUL LA MORI
	DENISE WETHINGTON
Background Design	PETER LLOYD
Background Composite Supervisor	MARTA RUSSELL
Background Painting Supervisor	JESSE SILVER
Background Artists	CHRISTOPHER D. ANDREWS
	GARY CONKLIN
	LARRY GROSSMAN
	COREY HARRIS
	TIA W. KRATTER
	PETER MUELLER
	DONALD TOWNS
	THOMAS WOODINGTON
Background Composite Assistants	CATHERINE EBY
	JOHN BATES
	SANDRA HARPER
	LORRAINE SCHWEIZER
Background Technical Inker	CAROLYN BATES

Background Plate Photography	DAVE IWERKS
	BERNIE GAGLIANO
	GENE LARMON
Background Plate Processing	TOM'S CHROMA LAB
Effects Animation Supervisor	LEE DYER
Effects Animation	JOHN VAN VLIET
	JOHN NORTON
	BARRY COOK
	MICHAEL WOLF
	CHRIS CASADY
	GAIL FINKELDEI
	DARRELL ROONEY
Assistant Effects Animators	ALLEN BLYTH
	ED COFFEY
	ERIC DURST
	PETER GULLERUD
	MARIA RAMOCKI
	RON STANGL
	DAVE STEPHAN
	MAUREEN TRUEBLOOD
	JOHN TUCKER
	DENNIS EDWARDS
	VICKI BANKS
	BYRON WERNER
Airbrush Supervisor	GREG BATTES
Airbrushers	ANDY ATKINS
	WILLIAM ARANCE
	JAMES WALTER SHAW
Effects Ink and Paint Supervisor	AURIL PEBLEY
Inkers	MAY KONG
	LILLIAN FITTS
	CRISTINA CASPARY
	BONNY NARDINI
	JANETTE DOWNS
	MARIA LUISA ALVAREZ
Lab Coordinator	ROB HUMMEL
Color Timer	MARTIN WELSH
Camera Schedule Coordinators	VALERIE HAGENBUSH
	CHRISTOPHER KEITH
Film Logging	EILEEN KURAMOTO
Photographic Process Lab Supervisors	ART CRUICKSHANK, A.S.C.
	PETER ANDERSON
Photo-Rotoscope Supervisors	RON OSENBAUGH
	FRANK AMADOR
	GAYL KELM
	ROGER RINATI
	DAVE SCOTT
Photo-Rotoscope Coordinator	MARIAN GUDER
Opticals	BOB BROUGHTON
Matte Production Supervisor	ARNIE WONG
Matte Production	LYNN SINGER
	JAN BROWNING
	ANIMATION CAMERA SERVICES
International Cel Coordination	RAULETTE WOODS
	JULIAN PENA
	PAUL HERNANDEZ
	PETER ARIES
Sample Art Supervisor	STEPHANIE BURT
Inking/Painting	ANN MARIE SORENSON
	CATHY CRUM
	RONNIE PRINZ
	ALISON DICECIO
	LISA ADAMS
	FLAVIA MITMAN
	PRISCILLA ALVAREZ
	ELAINE ROBINSON
Effects Unit Managers	DAVID V. LEESTER
	STEPHEN McEVEETY
Secretaries to Mr. Lisberger	ANNA-LISA NILSSON
	MARGARET FLOOK
Production Assistant	DEBRA DeVITO JACKSON
	WENDY WILLIAMS
	DENISE OLIVO
	MICHAEL G. CRAIG
	MICAL MORRISH
	MICHAEL SCHILZ
Mechanical Designs and Conversions	DON IWERKS
	BOB OTTO
	DON PORTERFIELD
	MECHANICAL CONCEPTS
Computer Systems and Software Development	DAVE INGLISH
	MARK KIMBALL
	DAVE BARNETT
	MARTY PRAGER
	BILL TONDREAU
	CINETRON INC.
Effects Transportation	KATY JOHNSON
	DYKE JOHNSON
Lithographic Production	G2 GRAPHIC SERVICE INC.

Production
Ink and Paint Matting by
CUCKOO'S NEST PRODUCTIONS
TAIPEI, TAIWAN

Animation Compositing Camera Supervisor	JIM PICKEL
Animation Compositing Camera	DON BAKER
	GLENN CAMPBELL
	NEIL VIKER
	JOHN AARDAL
	DANA ROSS
	BRANDY WHITTINGTON
	ANNIE McEVEETY
	KIERAN MULGREW
	DICK KENDALL
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MAGI SYNTHAVISION

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Scene Programmers	NANCY HUNTER CAMPI
	CHRISTIAN WEDGE
Synthavision Technologists	MARTIN O. COHEN, PH.D.
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	EUGENE TROUBETZKOY, PH.D.
	KENNETH PERLIN
Synthavision Production	JOHN BEACH
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Scene Programmers	CRAIG W. REYNOLDS
	WILLIAM DUNGAN, JR.
	LARRY MALONE
	JEREMY SCHWARTZ
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Object Digitizing	ART DURINSKI
Computer Production Coordination	LYNN WILKINSON

Transition to Electronic World and Main Title
ROBERT ABEL AND ASSOCIATES

Design Supervisor	KENNY MIRMAN
Systems Programmers	FRANK VITZ
	BILL KOVACS
	RICHARD BAILY
	TIM McGOVERN
Systems Supervisor	ROBERT ABEL
Camera	PATRIC KENLY
	KRIS GREGG

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Systems Supervisor	JUDSON ROSEBUSH
Computer Production Supervisor	JEFFREY KLEISER
Computer Animators	DONALD LEICH
	GENE MILLER

CAST

Kevin Flynn/Clu	JEFF BRIDGES
Alan Bradley/Tron	BRUCE BOXLEITNER
Ed Dillinger/Sark	DAVID WARNER
Lora/Yori	CINDY MORGAN
Dr. Walter Gibbs/Dumont	BARNARD HUGHES
Ram	DAN SHOR
Crom	PETER JURASIK
Peter/Sark's Lieutenant	TONY STEPHANO
Warrior #1	CRAIG CHUDY
Warrior #2	VINCE DEADRICK
Expert Disc Warrior	SAM SCHATZ
Head Guard	JACKSON BOSTWICK
Factory Guard	DAVE CASS
Guard #1	GERALD BERNS
Guard #2	BOB NEILL
Guard #3	TED WHITE
Guard #4	MARK STEWART
Guard #5	MICHAEL SAX
Guard #6	TONY BRUBAKER
Tank Commander	CHARLES PICERNI
Tank Gunner #1	PIERRE VUILLEUMIER
Tank Gunner #2	ERIK CORD
Conscript #1	LOYD CATLETT
Conscript #2	MICHAEL J. DUDIKOFF, II
Video Game Player	RICHARD BRUCE FRIEDMAN
Video Game Cowboy	LOYD CATLETT
Boys in Video Game Arcade	RICK FECK
	JOHN KENWORTHY

Stunt Players

Richard E. BUTLER, JR.
Stunt Coordinator

AL JONES
BILL BURTON
FRED LERNER
GLENN WILDER
BENNIE E. DOBBINS
RITA EGLESTON
HANK HOOKER
DONNA GARRETT

GARY EPPER
JAMES WINBURN
GARY JENSEN
WALTER SCOTT
LARRY HOLT
ROSS REYNOLDS
JAMES DEETH

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